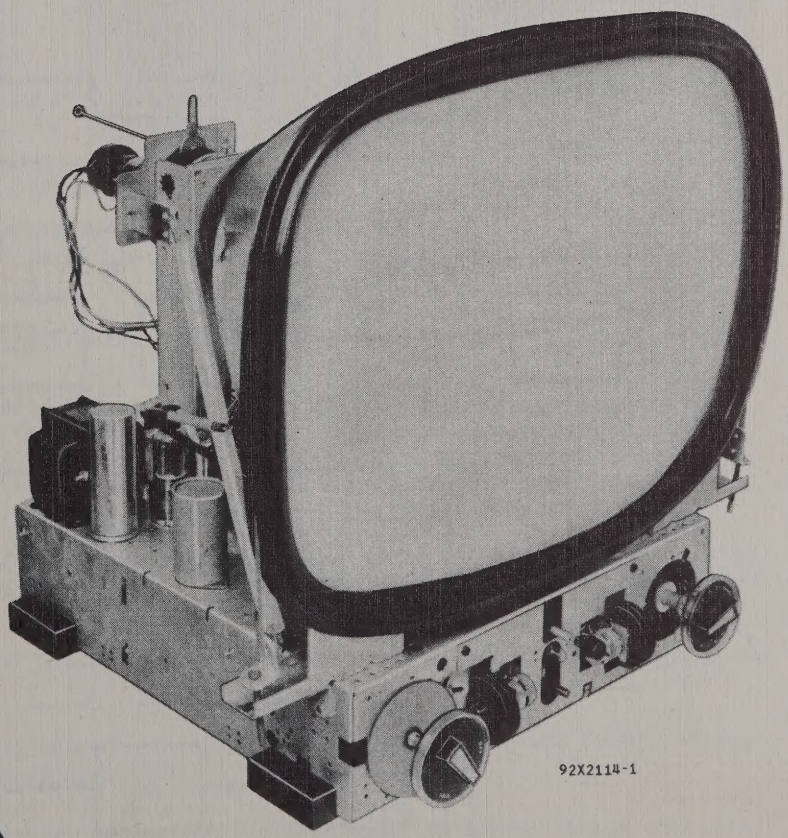
television service data

for V.H.F.-U.H.F.
chassis

B 1300D
D 1300D
F 1300D



92X2114-1

for V.H.F.
chassis

A 1300D
C 1300D
F 1300D

hallicrafters co.

X1198-1
53

CHASSIS IDENTIFICATION

A chassis stamp, located on the right side of the rear apron of the chassis, provides the necessary information to identify the chassis and thereby determine the applicable service data and schematic diagram. The first two letters of this chassis stamp indicates the chassis type and the number with letter suffix designates the chassis series. A production run number is stamped directly below or to one side of the chassis identification stamp. At the start of production, chassis are stamped RUN 1. Whenever a major production change is made in the chassis, the run number changes to the next higher number.

*CHASSIS TYPE NUMBER	MODELS CHASSIS MAY BE USED IN
A1300D	17T100M, 17T100B
B1300D	17T101M, 17T101B
C1300D	17K110M, 17K110B
D1300D	17K111M, 17K111B
E1300D	21T120M, 21T120B, 21K140M, 21K140B
F1300D	21T121M, 21T121B, 21M141M, 21K141B

* This service literature furnishes technical information on the CHASSIS ONLY. See the separate Service Data page (identified by model number at top of page) for cabinet parts list, general specifications, tube complement, and any specialized service instructions on the complete television receiver.

SIGNIFICANCE OF MODEL DESIGNATIONS

First Two Digits	First Letter	Next Three Digits	Last Letter
Size of Tube in Inches	Cabinet Design T- Table Model K- Console or Consolette	Model Number Odd numbers - VHF-UHF Even numbers - VHF	Cabinet Finish M - Mahogany B - Blonde

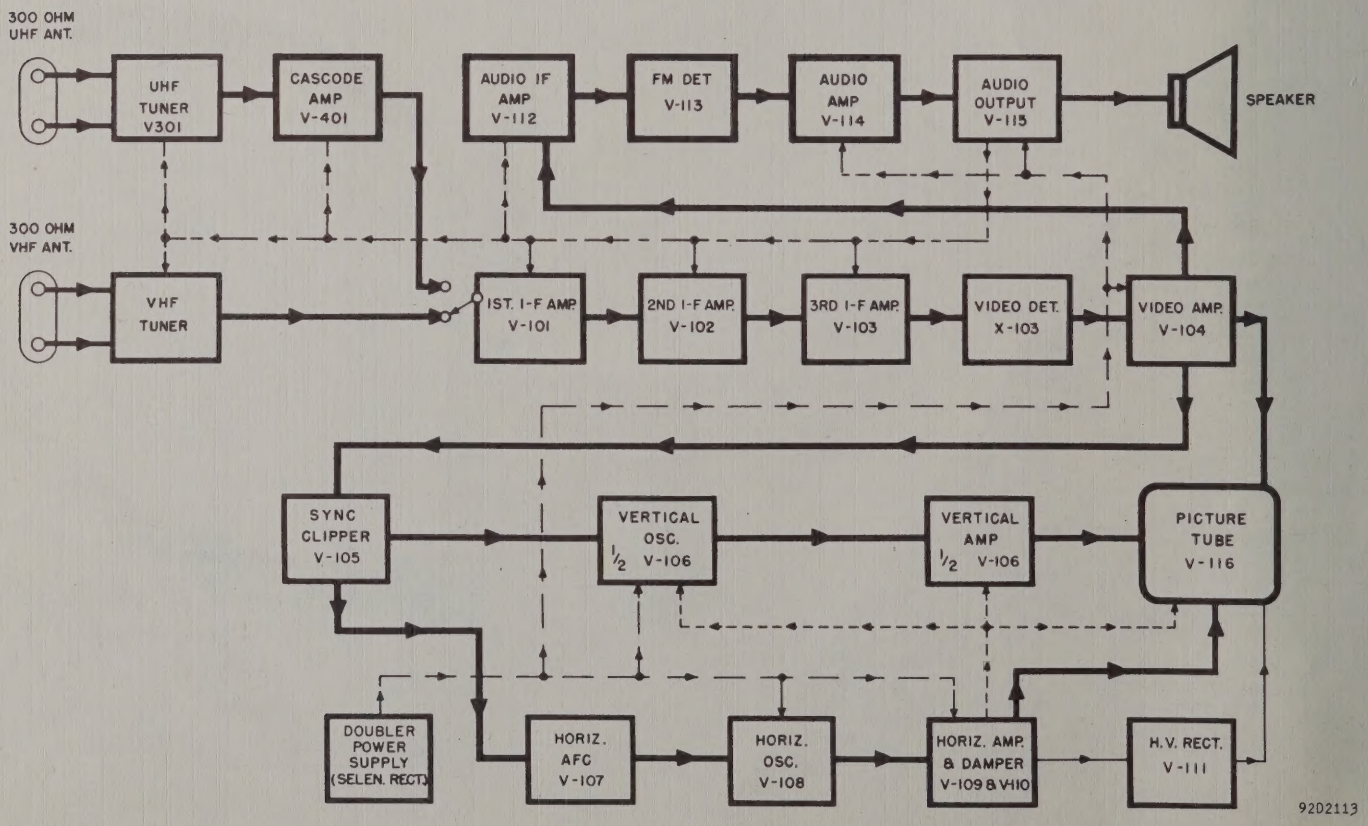


Fig. 502A. Block Diagram of a Typical Chassis

SERVICE ADJUSTMENTS

Note: The controls whose adjustment is outlined below are all located on the rear apron of the chassis with the exception of the centering device which is located on the neck of the picture tube. The sequence of "SERVICE ADJUSTMENTS" outlined herein is suggested as a convenient method of approach and is not an arbitrary procedure. Variations of the procedure are permitted to obtain the desired final results. The operating controls, located on the front panel, should be set for as good a pattern as possible before making any of the following adjustments.

VERTICAL AND HORIZONTAL HOLD CONTROLS - These two controls should be adjusted until a single steady picture is obtained. With average signal strength it should be possible to switch from one active channel to another without losing sync when these two controls are properly adjusted. These two controls will be found on the front apron of some chassis.

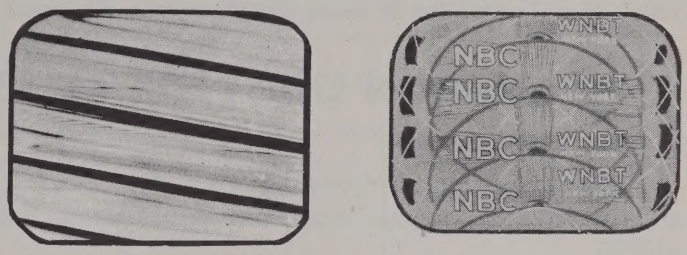


Fig. 503A. Improper Hold Control Adjustments

CENTERING — (C1300D & D1300D Chassis only)

Place the horizontal centering control, located on the rear apron of the chassis, in the approximate center of its range. Rotate the two ring magnets by the ears around the neck of the picture tube until the picture is properly centered. Slight readjustment of the ion trap may then be necessary. The horizontal centering control may now be used for fine adjustment.

(A1300D & B1300D Chassis only)

Same as above except horizontal control on rear apron omitted.

(E1300D & F1300D Chassis only)

Move the centering lever a short distance in any direction, up or down, or to either side. Slight readjustment of the ion trap setting may then be necessary.

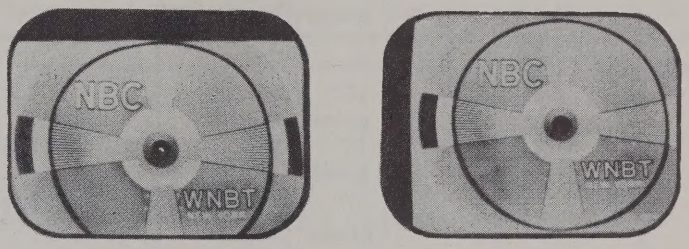


Fig. 503B. Improper Centering Adjustments

HEIGHT CONTROL AND VERTICAL LINEARITY ADJUSTMENT - A test pattern will be required for the proper adjustment of these two controls. The height control has a pronounced effect on the overall picture height and at the same time the adjustment of this control will expand or contract the top of the picture more than the bottom. The vertical linearity control will affect the height somewhat but will have a more pronounced effect on the bottom portion of the picture. The interaction between these two controls makes it necessary to adjust both for proper picture height and vertical linearity.

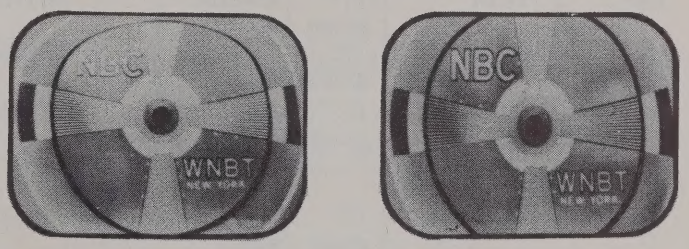


Fig. 503C. Improper Vertical Linearity Control Setting

Fig. 503D. Improper Height Control Setting

A.G.C. CONTROL SWITCH - The A.G.C. control switch should be adjusted for the best average performance on all active channels.

With this switch set in the 0-10 MILE position (counterclockwise) maximum AGC voltage is applied to the tuner. The video amplifier will not be overloaded by strong signals.

With this switch set in the OVER 30 MILES position (clockwise) minimum AGC voltage is applied to the tuner. Snow in the picture will be at minimum when the switch is in this position under weak signal or fringe area receiving conditions. If the AGC control switch is left in this position in areas where strong signals are received, poor picture quality will result along with a probable intercarrier buzz in the speaker. In some cases the sync pulses will be clipped and trouble will be encountered which will appear like a loss of sync unless this switch is properly adjusted.

WIDTH CONTROL - The width control should be adjusted until the picture fills the screen horizontally. Rotating this control in the clockwise direction will increase picture width while counterclockwise rotation will decrease picture width.

BRIGHTNESS CONTROL - This control should be adjusted in any given location for the best average picture from the various active channels which may be received.

FOCUS CONTROL - Adjust this control until the fine horizontal lines which make up the picture are clearly visible. Use the lines in the center portion of the picture for this adjustment.

HUM ADJUSTMENT - A small rheostat will be found mounted on the frame of some of the speakers. Adjust this rheostat with a small screw driver for minimum audible hum in the speaker.

COMPARISON OF 1300 VHF AND UHF-VHF CHASSIS

The A1300D, Run 1 may be considered the basic chassis in this series. All other chassis listed are based on the A1300D chassis with one or more modifications. See chart below for modifications used in any particular chassis.

COMPARISON CHART FOR THE 1300 VHF AND VHF-UHF CHASSIS

CHASSIS	PIX TUBE	TYPE	FOCUS	VHF CASCODE TUNER	UHF TUNER	MODIFICATIONS
A1300D						
Run 1	17HP4	17" glass	Electro-static	1E1852	----------	Basic Chassis
Run 2	17HP4	17" glass	Electro-static	1E1846	----------	I.
B1300D						
Run 1	17HP4	17" glass	Electro-static	1C1717	1E1660	II, III, IV
Run 2	17HP4	17" glass	Electro-static	1C1717	1E1855	II, III, V
Run 3	17HP4	17" glass	Electro-static	1E1670	1E1660	III, IV, VIII
C1300D						
Run 1	17HP4	17" glass	Electro-static	1E1718	----------	VI, VII
Run 2	17HP4	17" glass	Electro-static	1E1852	----------	VII
Run 3	17HP4	17" glass	Electro-static	1E1846	----------	I, VII
D1300D						
Run 1	17HP4	17" glass	Electro-static	1E1670	1E1660	III, IV, VII, VIII
Run 2	17HP4	17" glass	Electro-static	1C1717	1E1660	II, III, IV, VII
Run 3	17HP4	17" glass	Electro-static	1C1717	1E1855	II, III, V, VII
E1300D						
Run 1	21AP4	21" metal	P. M.	1E1852	----------	IX
Run 2	21AP4	21" metal	P. M.	1E1846	----------	I, IX
F1300D						
Run 1	21AP4	21" metal	P. M.	1C1717	1E1660	II, III, IV, IX
Run 2	21AP4	21" metal	P. M.	1C1717	1E1855	II, III, V, IX
Run 3	21AP4	21" metal	P. M.	1E1670	1E1660	III, IV, VIII, IX

LIST OF MODIFICATIONS

MODIFICATION I

The 1E1852 VHF Tuner is replaced by the 1E1846 Tuner.
L-101 (51B1643) is replaced by L-101-1 (51B1841). (See Schematic)
C-101 (1000 mmf. GMV. 500 V. ceramic disc) is added between L-101-1 and grid pin 1 of V-101.

MODIFICATION II

The 1E1852 tuner is replaced by the 1C1717.
This necessitates the addition of C-101 (1000 mmf. GMV. 500V., ceramic) between terminal 1 of the tuner and L-101, I-F coupling coil.

MODIFICATION III

On UHF models an additional I-F amplifier is added between the output of the UHF tuner and the first regular I-F amplifier (V-101). Physically these parts will be mounted on the UHF tuner. See schematic for circuit details. Parts for the special Cascode I-F amplifier may be identified by schematic symbols in the 400 series.

The UHF-VHF switch located on the front panel:

IN VHF POSITION	IN UHF POSITION
supplies High B+ to cascode amplifier in VHF tuner.	supplies High B+ for special I-F cascode amplifier.
supplies Low B+ to oscillator of VHF amplifier.	supplies Low B+ to oscillator in UHF tuner.
connects output of VHF tuner to input circuit of V-101.	connects output of special I-F cascode amplifier to input circuit of V-101.
opens circuit to turn off UHF dial light.	supplies 6.3 volts to LM-301, dial light for UHF.

MODIFICATION IV

The 1E1660 UHF tuner is added to the circuit. See schematic for full details of the circuit.

MODIFICATION V

The 1E1855 UHF tuner is added to the circuit. See schematic for full details of the circuit.

MODIFICATION VI

The 1E1852 VHF tuner is replaced by the 1E1718 tuner.
This necessitates the addition of C-101 (1000 mmf. GMV. 500 V., ceramic) between terminal 1 of the tuner and L-101, the I-F coupling coil.

LIST OF MODIFICATIONS (Cont.)

MODIFICATION VII

A. T-107 is replaced by T-107-1 (55D197) which includes:

1. The addition of R-190 (50 ohms) horizontal centering control, mounted on rear apron.

2. R-167 (3.3 ohms) is replaced by R-167-1 (2.2 ohms) in filament circuit of V-111.

B. L-119 (53B264) wound on C-172 (0.1 mfd. 200 V., paper tubular) connected between terminal 4 of T-107-1 and terminal 3 of deflection yoke.

C. L-118 (53C303) replaced by L-118-1 (53A271) including special socket for deflection yoke plug. Pins 1 and 8 of L-118-1 are tied together.

D. R-169 (15 ohms 1 watt, carbon) and C-155 (0.1 mfd. 600 V., paper tubular) are deleted.

E. Connection between terminal 1 of the deflection yoke and pin 5 of V-107 (horizontal A.F.C.tube) is removed.

F. Connection between pin 10 of pix tube and terminal 6 of deflection yoke is removed.

G. Terminal 1 of deflection yoke is connected to junction of pin 10 of pix tube and top of focus control.

H. R-191 (22,000 ohms 1/2 watt, carbon) is added between pin 5 of V-107 and ground.

I. C-173 (0.006 mfd. 600 V., paper tubular) is added between pin 5 of V-107 and ground.

J. C-174 (0.0047 mfd. 1000 V., paper tubular) and R-192 (33,000 ohms 1 watt, carbon) series connected are added between pin 5 of V-107 and terminal 2 of T-107-1.

K. R-160 (33,000 ohms 1/2 watt, carbon) is replaced by R-160-1 (8200 ohms 1/2 watt, carbon).

L. R-193 (180,000 ohms 1/2 watt, carbon) is added between R-162-1 and terminal 1 of T-107-1.

M. R-162 (100,000 ohms 1/2 watt, carbon) is replaced by R-162-1 (220,000 ohms 1/2 watt, carbon).

N. C-175 (0.1 mfd. 600 V., paper tubular) is added between junction of R-162-1 and R-193 and ground.

O. C-150 (5000 mmf. 500 V., ceramic disc) is replaced by C-150-1 (560 mmf. 500 V., 10% silver mica).

P. R-163 (10,000 ohms 1/2 watt, carbon) is replaced by R-163-1 (8200 ohms 1/2 watt, carbon).

Q. R-165 (8200 ohms 2 watts, carbon) is replaced by R-165-1 (10,000 ohms 2 watts carbon).

R. Pins 3 and 8 of V-110 (damper tube) are tied together.

S. C-146 (.02 mfd. 400 V., paper tubular) is replaced by C-146-1 (.01 mfd. 400 V., paper tubular.)

T. C-151 (.1 mfd. 600 V., paper tubular) is replaced by C-151-1 (.047 mfd. 400 V., paper tubular.)

U. R-159 (8200 ohms 1/2 watt, carbon) is replaced by R-159-1 (5600 ohms 1/2 watt, carbon).

V. R-164 (470,000 ohms 1/2 watt, carbon) is replaced by R-164-1 (390,000 ohms 1/2 watt, carbon).

LIST OF MODIFICATIONS (Cont.)

MODIFICATION VIII

The 1E1852 VHF tuner is replaced by the 1E1670 tuner.
This necessitates the addition of C-101 (1000 mmf. GMV. 500 V., ceramic) between terminal 1 of the tuner and L-101, the I-F coupling coil.

MODIFICATION IX

A. The 17HP4 picture tube is replaced by the 21AP4 picture tube.

B. The high voltage lead (pin 7, V-111) is connected to R-168 (1 megohm 1 watt, carbon). The other side of R-168 is connected to the metal cone of the 21AP4.

C. C-154 (500 mmf. 20,000 V., ceramic) is connected between pin 7 of V-111 and ground.

D. Picture tube socket 6A465 is replaced by socket 6A484 with wire to pin 6 deleted.

E. R-189 (1.5 megohms) focus control is deleted.

PICTURE TUBE REMOVAL

1. Remove the chassis from the cabinet. Note that on chassis with the horizontal and vertical hold controls on the rear apron the knobs on the control shafts and the A.G.C. control switch must be removed before the cabinet back may be removed. These are push-on type knobs.

2. Insure the discharge of the high voltage power supply by disconnecting the anode plug and shorting it to the chassis. Also short the anode socket or metal cone of the picture tube to the chassis.

3. Remove the picture tube socket from the base of the tube.

4. Slip the ion trap and the centering device from the neck of the tube. On some chassis, the centering device is an integral part of the deflection yoke assembly.

5. Carefully remove the rear support tension spring on each side of the picture tube. If a glass cone picture tube is involved, remove the metalized paper picture tube shield and ground by unhooking the springs on each side and the hook on the top center of the picture tube mounting strap.

6. Remove the mounting strap from the front rim of the picture tube.

7. Lift the front of the picture tube just far enough to clear the front mounting brackets and slip the tube forward until the neck is clear of the deflection yoke and the rubber collar. Use a slight twisting pull to break the cone of the tube from the rubber collar if the two are stuck together. Loosen the deflection yoke adjustment screw if required for clearance when raising the front of the picture tube over the front mounting brackets.

CAUTION - IF THE TUBE FAILS TO SLIP OUT EASILY, INVESTIGATE AND REMOVE THE CAUSE OF TROUBLE. DO NOT USE FORCE AS THE NECK OF THE PICTURE TUBE IS EASILY BROKEN.

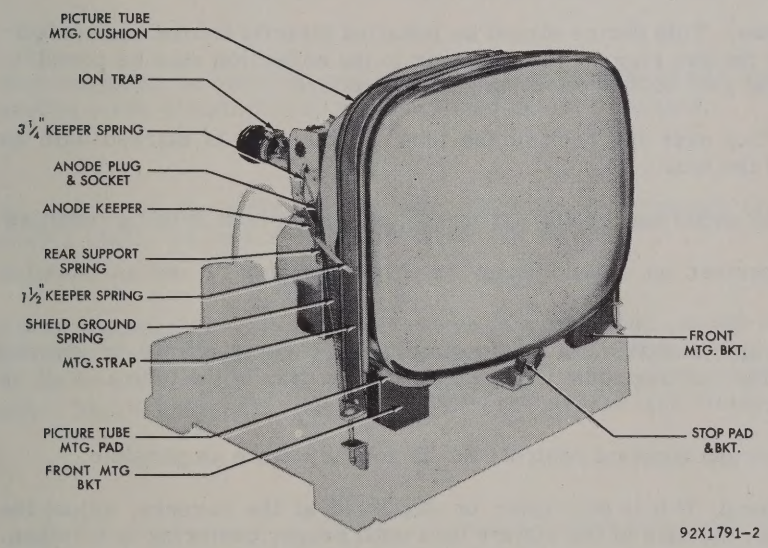


Fig. 509A. 17" Glass Pix Tube Mounting

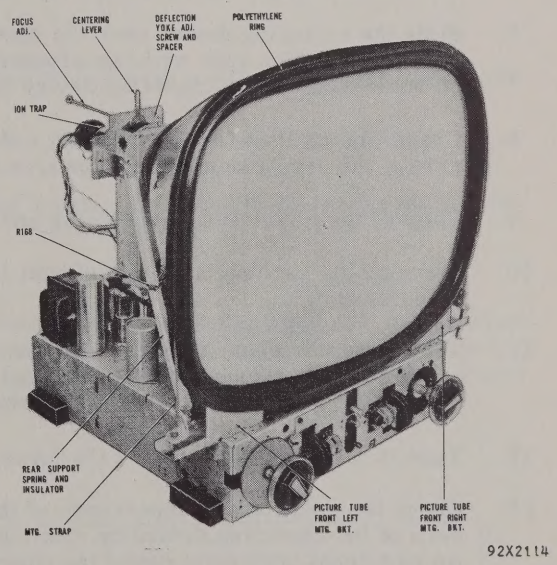


Fig. 509B. 21" Metal Pix Tube Mounting

PICTURE TUBE INSTALLATION AND ADJUSTMENT

1. Position the tube so that the anode socket is located at the left side of the tube when viewed from the front face. A metal cone tube will not have an anode socket but will require the polyethylene mounting ring around the front rim of the tube with the joint in the ring on the bottom center of the tube.

2. Insert the neck of the tube through the rubber collar and the deflection yoke. Seat the front of the tube on the front mounting brackets. The groove in the polyethylene mounting ring fitting over the front mounting brackets or the picture tube face resting against the front stop pad will determine the forward position of the tube. Be sure that the face of the picture tube rests against the stop pad and not against the bracket for this pad which is provided on chassis which use glass cone picture tubes.

3. Place the mounting strap around the front of the tube. On metal cone tubes place the 4" rubber strip in the top center of the groove in the polyethylene mounting ring. At the same time be sure that the copper anode connector strap is inserted under the polyethylene mounting ring on the left side of the picture tube when viewed from the front. Be sure the picture tube mounting cushion is placed under the mounting strap for glass cone tubes.

4. Tighten the screws on each end of the mounting strap and replace the rear support tension spring on each side of the picture tube. On glass cone picture tubes replace the metalized paper picture tube shield and ground with the metalized surface next to the tube. The hook in the center of this shield should be hooked over the top center of the picture tube mounting strap and the springs on each end should be hooked around the screws on each end of the mounting strap. If the replacement glass pix tube does not have an outer aquadag coating it will be necessary to install C-154 (500 mmf. 20 KV.). See schematic. This capacitor will already be installed in chassis with metal cone picture tubes.

5. Press the deflection yoke firmly forward against the cone of the picture tube and tighten the deflection yoke adjusting screw.

6. The picture tube neck should pass through the approximate center of the deflection yoke. If it does not, loosen the deflection yoke bracket adjustment screws and reposition the yoke.

7. Slide the centering device over the neck of the tube. This device should be installed directly behind and contacting the deflection yoke with the adjusting ears for the two ring magnets as near to the deflection yoke as possible. On some chassis the centering device is an integral part of the deflection yoke assembly.

8. Check the ion trap for any marking and slip the trap over the neck of the tube. If the trap is marked with an arrow, the arrow should point towards the face of the tube.

9. Connect the picture tube anode plug and replace the anode keeper and springs if a glass pix tube is being installed.

10. Connect the picture tube socket and turn the receiver on. Don't forget the chassis is "hot" - use an isolation transformer.

11. Turn up the brightness control and set the ion trap for maximum raster brilliance, backing off the brightness control as the maximum point is approached. The ion trap must be rotated about the axis of the tube as well as shifted along the neck to obtain the proper setting.

12. Tune in a test pattern and set the focus, brightness and contrast controls for as good a picture as possible.

13. Check the position and appearance of the test pattern. If it is off center or shadowed at the corners, adjust the ears of the centering device by rotating them about the axis of the picture tube until proper centering is obtained. An additional horizontal centering control is located on the rear apron of some chassis. This control should be in the approximate center of the range over which it may be rotated before adjusting the centering device.

14. If the lines of the raster are not horizontal or square with respect to the escutcheon, loosen the deflection yoke adjustment screw and rotate the deflection yoke until the proper raster position is obtained. Press the deflection yoke firmly against the cone of the picture tube and tighten the adjustment screw.

15. Follow the procedure under "SERVICE ADJUSTMENTS" and make any minor adjustments necessary to obtain a properly adjusted pattern.

HIGH VOLTAGE WARNING

OPERATION OF THE RECEIVER CHASSIS OUTSIDE OF THE CABINET INVOLVES DANGER OF ELECTRICAL SHOCK. USE A POWER LINE ISOLATION TRANSFORMER AND EXERCISE ALL NORMAL HIGH VOLTAGE PRECAUTIONS WHEN WORKING WITH THIS RECEIVER.

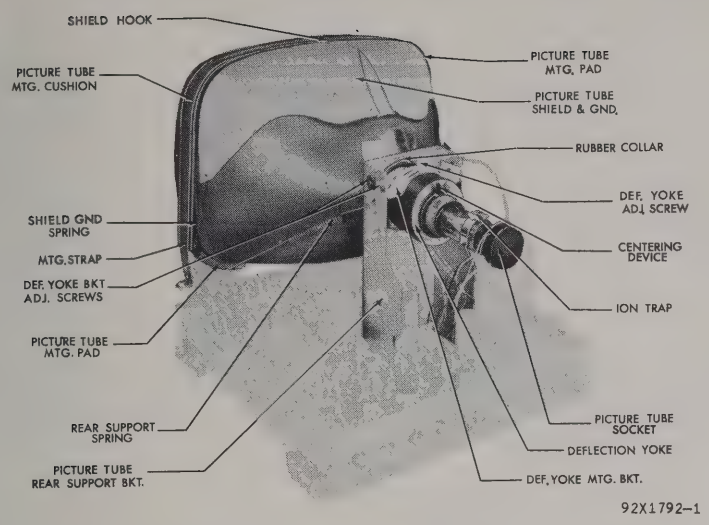


Fig. 511A. 17" Glass Pix Tube Mounting

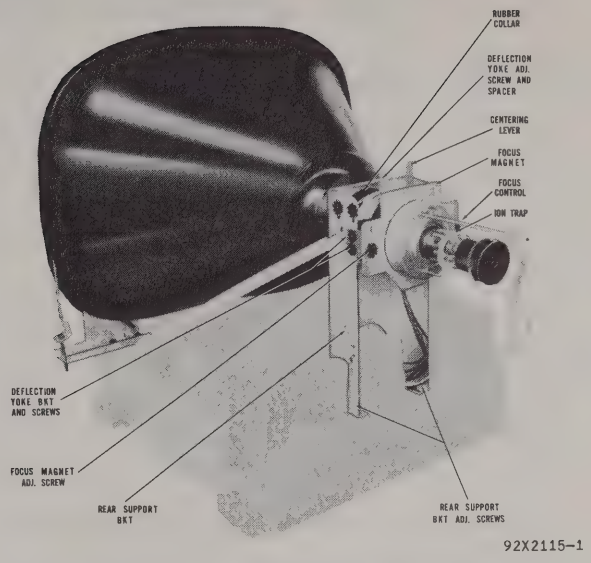


Fig. 511B. 21" Metal Pix Tube Mounting.

PICTURE TUBE ANODE HIGH VOLTAGE MEASUREMENT

The second anode potential will be approximately 16,000 volts. If it is possible to obtain good picture brilliance, the second anode potential is correct and need not be measured.

The setting of the width control will affect the high voltage on the second anode. If the width control is set for excessive width, the second anode potential will be low.

If it is necessary to measure the voltage present on the second anode, a meter specifically designed for high voltage measurements should be used. The contrast and brightness controls should be rotated to the minimum position and the anode plug should be connected to the tube. Under these conditions the test meter will load the high voltage power supply approximately the same amount as the picture tube would during normal operation.

SAFETY FIRST

DO NOT USE HAND HELD FLEXIBLE TEST LEADS WHEN MAKING SECOND ANODE HIGH VOLTAGE MEASUREMENTS. ANY ACCIDENTAL CONTACT WITH THE HIGH VOLTAGE PRESENT IN THIS CIRCUIT MAY CAUSE A SEVERE BURN OR IN SOME CASES BE FATAL.

FM SOUND CHANNEL ALIGNMENT FOR 1300D SERIES CHASSIS

EQUIPMENT REQUIRED

Signal generator covering 4 to 30 mc. unmodulated.

Vacuum tube voltmeter (VTVM).

Sound alignment test circuit shown in Fig. 512A.

Power line isolation transformer.

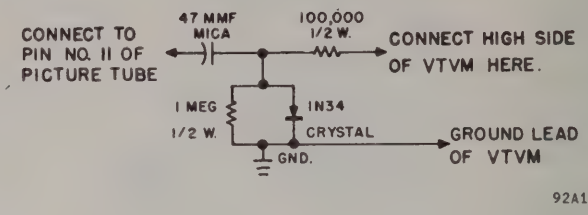


Fig. 512A. Sound Alignment Test Circuit

PROCEDURE

1. Connect all test equipment to a common ground. Connect the TV chassis to this same ground after installing an isolation transformer between the power line and the TV chassis. One side of the line cord connects directly to the TV chassis and an isolation transformer must be used for safety.

2. Set the channel selector to any vacant channel and the contrast control at minimum.

3. Connect the signal generator output through a .005 mfd. capacitor to test point Ⓓ shown in schematic diagram. Ground the shield of the generator output cable to the chassis.

4. Connect the sound alignment detector circuit and VTVM as shown in Fig. 512A. Adjust the 4.5 mc. generator output (unmodulated) to give a 1 volt reading on the VTVM.

5. Adjust the 4.5 mc. trap adjustment (L-107) at 4.5 mc. for a minimum VTVM reading.

6. Disconnect the test circuit and connect the VTVM to test terminal Ⓑ (Pin 2 of FM detector, V-113). See schematic diagram.

7. Adjust the 4.5 mc. amplifier grid adjustment (L-114) and the primary of T-108 (bottom core) at 4.5 mc. for a maximum VTVM reading.

8. Connect the VTVM to test terminal Ⓒ, shown in the schematic diagram. Adjust the secondary of T-108 (top core) at 4.5 mc. for the zero reading which occurs between the positive and negative peaks. If the zero reading occurs at more than one setting, use the position nearest the top limit of the core.

9. Shift the signal generator an equal amount on either side of 4.5 mc. and touch up the primary of T-108 (bottom core) for approximately equal peaks. Use just enough signal output to obtain one volt peaks for best results.

HORIZONTAL OSCILLATOR ADJUSTMENT

If the horizontal hold control fails to restore synchronization, the horizontal stabilizer coil (L-113) should be adjusted. Procedure for this adjustment is as follows:

1. Set the horizontal hold control in the approximate center of the range over which it may be rotated.

2. Set the channel selector to an active channel and adjust the horizontal stabilizer for a single steady picture. See Fig. 512B.

3. Rotate the horizontal hold control full clockwise. The picture may or may not remain in sync. If it does, momentarily switch the channel selector to another channel and return it to the original channel. The picture should now be slightly out of sync.

4. Rotate the horizontal hold control full counterclockwise. The picture may or may not remain in sync. If it does, momentarily switch the channel selector to another channel and return it to the original channel. The picture should now be slightly out of sync.

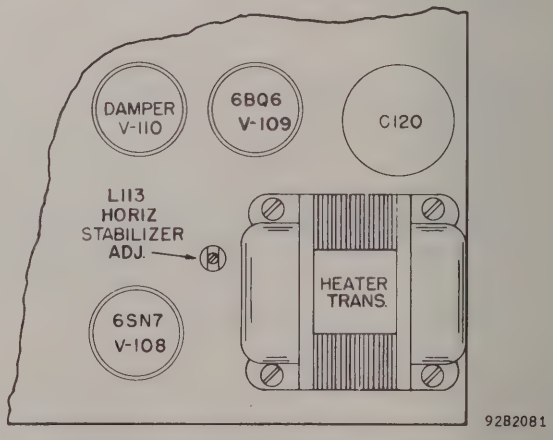
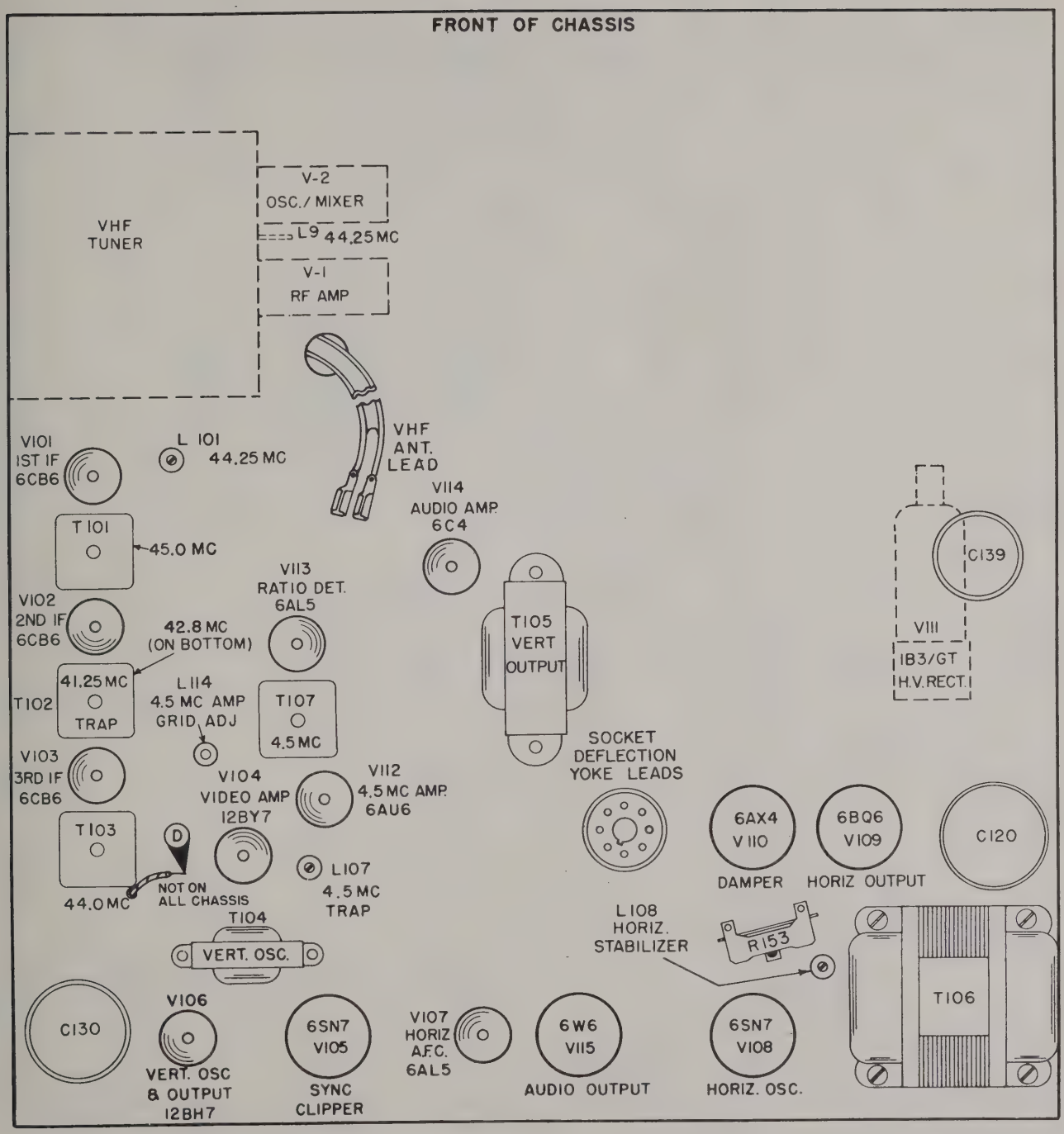


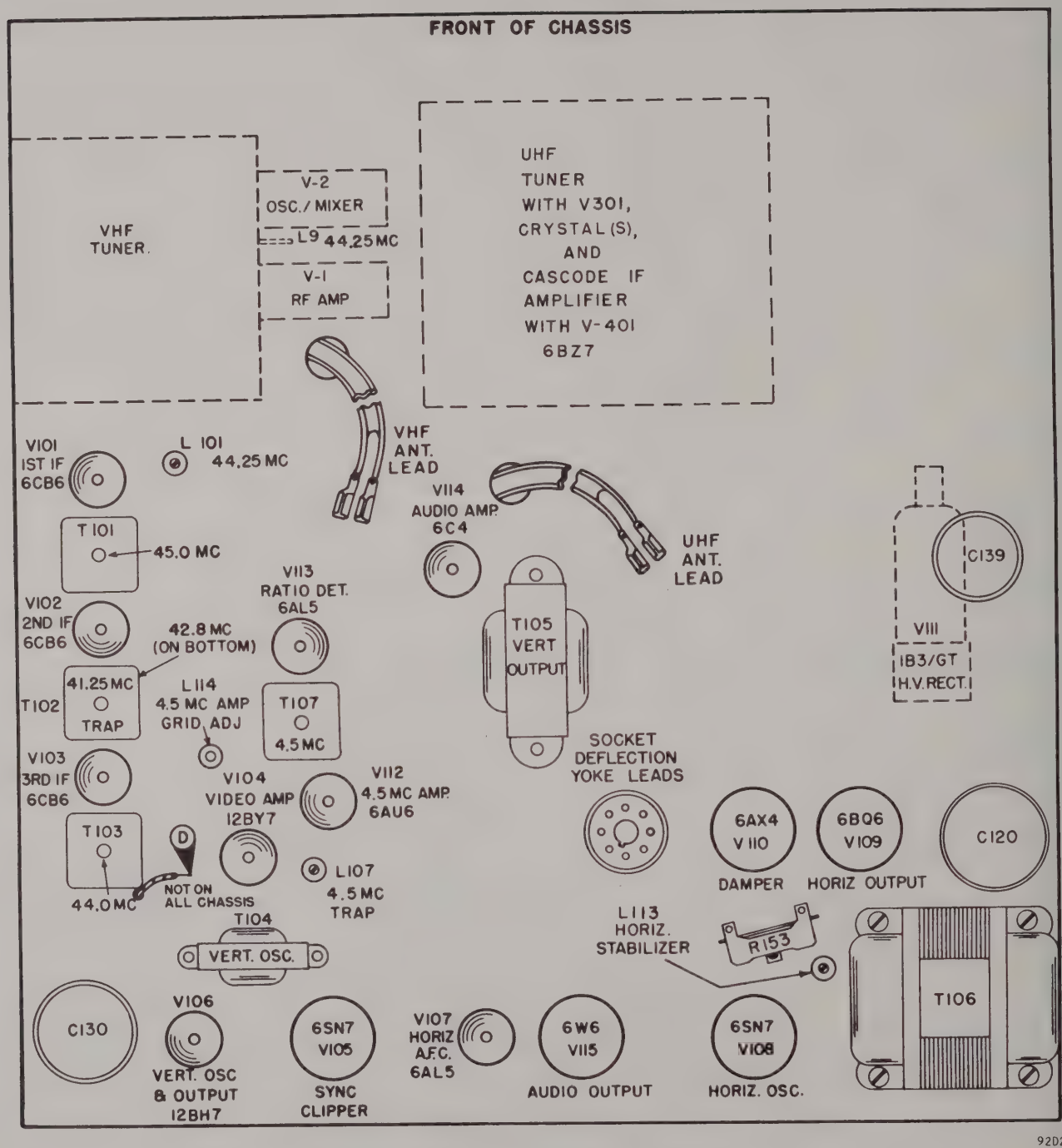
Fig. 512B. Horizontal Oscillator Adjustment Point

When the horizontal stabilizer coil is properly adjusted the results outlined in steps 3 and 4 will be obtained. If the correct results are not obtained, repeat steps 2, 3 and 4 until they are.



92D2079-1

Fig. 513A. Top View Alignment Locations for Chassis A1300D, C1300D, & E1300D.



92D2116-1

Fig. 514A. Top View Chassis Alignment Locations for Chassis B1300D, D1300D, & F1300D

LAYOUT OF CONTROLS

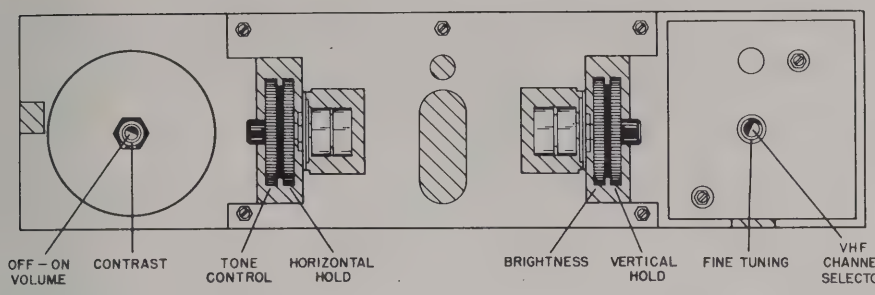


Fig. 515A. Front Controls VHF Chassis A1300D, C1300D, E1300D

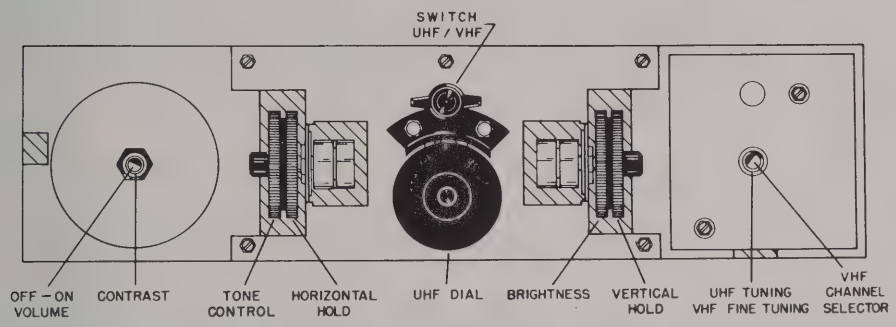


Fig. 515B. Front Controls VHF-UHF Chassis B1300D, D1300D, F1300D

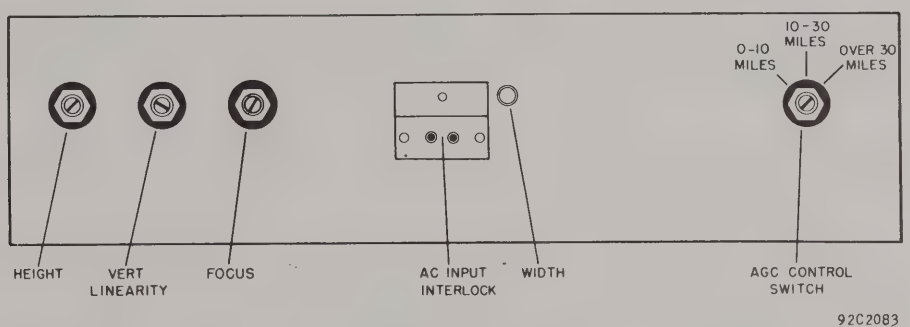


Fig. 515C. Rear Controls for A1300D and B1300D

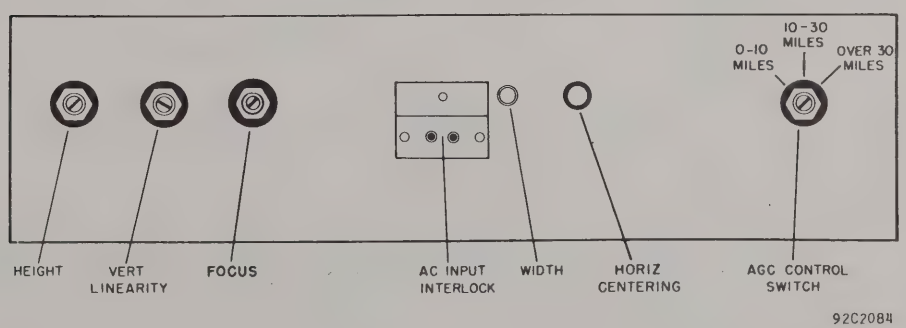


Fig. 515D. Rear Controls for C1300D and D1300D

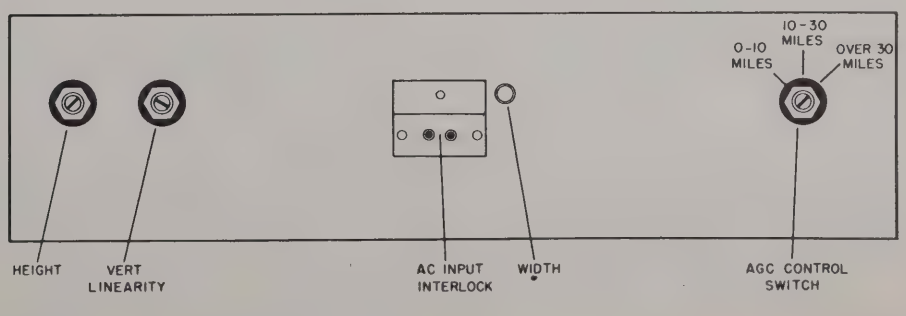


Fig. 515E. Rear Controls for E1300D and F1300D

I-F AMPLIFIER ALIGNMENT FOR 1300D CHASSIS

EQUIPMENT REQUIRED

SWEEP GENERATOR	RCA type WR-59B or equivalent.
MARKER GENERATOR	RCA type WR-39C Television Calibrator or equivalent.
OSCILLOSCOPE	RCA type WO-56A or equivalent.
VACUUM TUBE VOLTMETER (VTVM)	RCA type WV-97A or equivalent.
BIAS SOURCE	Three volt battery.
TEST CIRCUIT	Shown in Fig. 516A.
ISOLATION TRANSFORMER	150 watt rating or higher.

PROCEDURE

1. Set the UHF/VHF switch to the VHF position. Set the channel selector to channel 3 or 4, whichever is vacant.

2. Connect all test equipment to a common ground. Connect the TV chassis to this same ground after installing an isolation transformer between the power line and the TV chassis. One side of the line cord connects directly to the TV chassis and an isolation transformer must be used for safety. Allow a 15 minute warm up period.

3. Set the AVC switch on the rear chassis apron to the 0-10 MILE (counterclockwise) position.

4. Connect the negative side of a 3 volt battery supply to test point Ⓔ through a 1,000 Ω resistor. Connect the positive side of the supply to the TV chassis. See schematic diagram.

5. Connect a VTVM to test point Ⓓ through a 47,000 ohm carbon resistor. Connect the ground side of the meter to the TV chassis. See Fig. 513A or 514A.

6. Connect the high side of a marker generator to the shield of the osc./mixer tube. This connection will capacitively couple the generator output to the tube. Make sure the shield is ungrounded by raising it above the grounded clips that hold it in place.

7. Set the marker generator output (unmodulated) for a two volt negative dc reading on the VTVM and adjust the three i-f transformers, L-9, and L-101 according to the I-F AMPLIFIER ALIGNMENT CHART shown below. Readjust the signal generator output as required to maintain the two volt VTVM reading.

I-F AMPLIFIER ALIGNMENT CHART

Signal Generator Frequency (No Modulation)	Adjustment	Transformer or Coil Location	VTVM Indication
45.0 MC	T-101	See Fig. 513A or 514A.	Maximum
42.8 MC	T-102 (bottom)		Maximum
44.0 MC	T-103		Maximum
41.25 MC	T-102 (top)		Minimum
42.8 MC	T-102 (bottom)		Maximum
44.25 MC	§*L-101 (top) or L-101-1 (bottom)		Maximum
44.25 MC	#L-9		Maximum

IMPORTANT — The wax in the end of the coil forms holding the iron core in position may be softened for adjustment of the core by means of a heated screwdriver or a small pencil type soldering iron inserted into the wax. Remelt wax after adjustment.

* NOTE: Temporarily connect the series resistor-capacitor combination shown in Fig. 516A to the tuner test point TP-2 when making this adjustment on all tuners except the 1E1852 or 1E1846. With the 1E1852 or 1E1846 tuner hold the channel selector between channels when making this adjustment.

§ NOTE: Top adjustment of L-101-1 may be used in conjunction with L-9 of 1E1846 tuner to give proper band width response.

NOTE: Temporarily connect the series resistor-capacitor combination shown in Fig. 516A to the grid (pin 1) of V-101 the 6CB6 first i-f amplifier when making this adjustment.

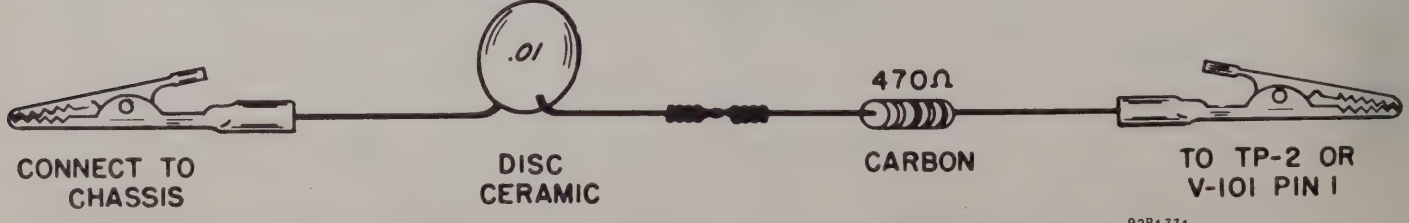


Fig. 516A. Test Circuit for I-F Amplifier Alignment

92B1771

8. Disconnect the VTVM and marker generator connected in steps 4 and 5. The balance of the set-up should be as directed in steps 1, 2, 3 and 6.

9. Capacitively couple the high side of the sweep generator r-f output to the osc./mixer tube by connecting to the tube shield which has been raised above its grounding clips. The ground side of the sweep generator should be connected to the receiver chassis. Adjust the generator to sweep from 40.5 to 46.5 MC.

10. Loosely couple the high side of the marker generator to the high side of the sweep generator by clipping the marker generator r-f lead over the insulation of the sweep generator r-f lead. The ground side of the marker generator should be connected to the receiver chassis.

IMPORTANT — To prevent overloading of the i-f amplifier keep the output of the sweep and marker generators as low as possible. The marker generator output should be just high enough to produce visible pips on the pattern. In some cases the 41.25 MC pip will not be visible unless the r-f output of the marker generator is increased to overcome the attenuation of the 41.25 MC signal by the trap in the top of T-102.

11. Connect the sweep output terminals on the sweep generator to the input of the horizontal amplifier in the oscilloscope.

12. Connect one side of a 47,000 ohm 1/2 watt resistor to test point Ⓓ shown in the schematic diagrams. Connect the other end of the resistor to the high side of the input terminals for the vertical amplifier in the oscilloscope. The scope ground terminal connects to the receiver chassis. Keep the scope leads away from the internal chassis wiring, particularly the horizontal output section.

13. Reduce the r-f output of the sweep generator and increase the gain of the vertical amplifier in the oscilloscope as much as possible without introducing an excessive amount of noise on the test pattern. This will prevent overloading of the i-f system.

14. Check the position of the markers shown in Fig. 517A. Adjust only the bottom cores of T-101, T-102 and T-103 for a response curve of maximum amplitude with a slightly tilted flat topped appearance as shown in Fig. 517A. This tilt is required to compensate for the capacitive coupling used for the signal generators. The actual response obtained will be flat when the pattern viewed on the oscilloscope has this tilt. The bottom core of T-103 will primarily control the tilt of this central portion of the curve.

    The bottom core of T-101 should be adjusted to position the 45.75 MC marker in the 50% position shown in Fig. 517A.

    The bottom core of T-101 should be adjusted to determine the slope of the curve between 41.25 MC and 42.8 MC with the 42.25 MC marker down 50% on the curve as shown in Fig. 517A.

    Under no circumstances should an attempt be made to adjust L-9, L-101 and the 41.25 MC trap in the top of T-102 by means of an oscilloscope and sweep generator. Maladjustment of these coils does not give a noticeable indication on the oscilloscope. Align these coils by following the procedure given in steps 1 through 7 only.

I-F AMPLIFIER SENSITIVITY MEASUREMENT

To determine the i-f amplifier sensitivity, disconnect the r-f output lead from the tuner where it connects to L-101. Temporarily connect one side of a .005 mfd. mica or ceramic capacitor to grid pin 1 of the first 6CB6 i-f amplifier tube V-101. Connect the unmodulated r-f output of a marker generator to the other side of the capacitor and the ground side of the generator to the TV chassis. Set the marker generator to 43.75 MC. Connect a VTVM as directed in step 4 of the alignment procedure. The 3 volt battery must be removed. If a generator output of 200 to 400 microvolts produces a 1 volt reading on the VTVM, the i-f amplifier sensitivity is normal.

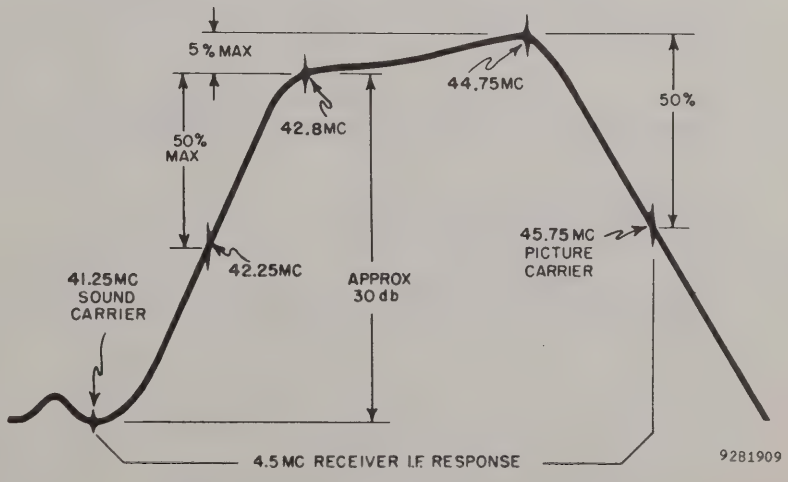


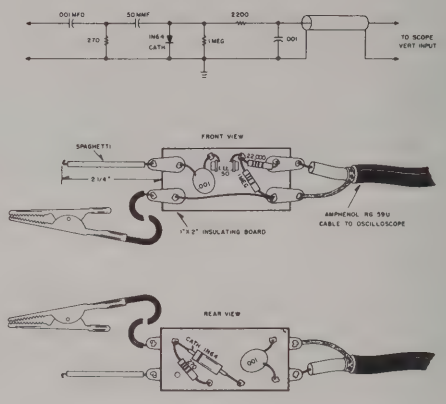
Fig. 517A. Typical Response for 41.25 to 45.75 MC I-F Amplifiers

ALIGNMENT OF THE CASCODE I-F AMPLIFIER IN UHF/VHF CHASSIS

NO ATTEMPT SHOULD BE MADE TO PERFORM THE FOLLOWING PROCEDURE UNTIL THE BALANCE OF THE TV RECEIVER IS KNOWN TO BE IN PROPER OPERATING CONDITION AND THE REGULAR I-F ALIGNMENT HAS BEEN COMPLETED. (See Fig. 523A for location of adjustments and Fig. 518B for response curve.)

EQUIPMENT REQUIRED

Sweep Generator_____RCA type WR-59B or equiv.
Marker Generator_____RCA type WR-39C or equiv.
Oscilloscope_____RCA type WO-56A or equiv.
Detector Circuit_____Shown 12 Fig. 518A.
Isolation Transformer____ 150 watt rating or higher.



92C2009

Fig. 518A. Detector Circuit for Cascode I-F Alignment

PROCEDURE

1. Set the UHF/VHF switch to UHF position. Select an inactive channel between 35 and 45.

2. Connect all test equipment and the television chassis to a common ground. Be sure to use an isolation transformer for the receiver chassis. Allow at least a 5 minute warm-up in this position.

3. Connect the hot lead of the sweep generator to pin 7 of V-401 (Cascode I-F amplifier). Set the generator to sweep from 40 to 48 mcs.

4. Connect the oscilloscope to the plate circuit of V-101 through the detector circuit of Fig. 518A.

5. Loosely couple the hot lead of the marker generator to the hot side of the sweep generator through a 22 mmf. capacitor. This coupling may also be accomplished by clipping the hot lead from the marker generator over the crystal diode in the detector circuit in Fig. 518A.

6. Adjust L-403 to place the 45.75 marker on one peak of the response curve on the oscilloscope. Note the position of the 42.75 marker.

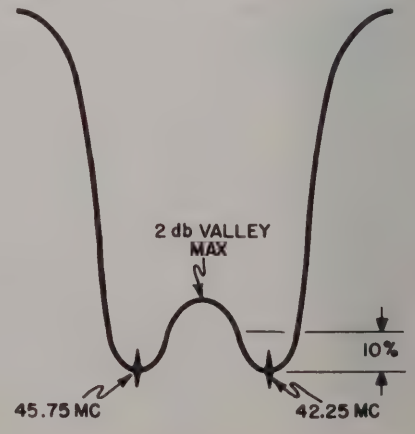
7. Adjust L-405 by compressing or spreading its turns to equalize the two peaks on the response curve on the scope.

THE TRIMMER C-401 (USED WITH 1E1660 TUNER) IS ALIGNED AT THE FACTORY AND UNDER NORMAL CIRCUMSTANCES WILL NOT REQUIRE FURTHER ADJUSTMENT. ITS SETTING SHOULD NOT BE CHANGED UNLESS THE ABOVE PROCEDURE DOES NOT PRODUCE THE DESIRED RESPONSE, AND THEN ONLY WITH THE PROPER UHF SWEEP GENERATOR AND BY QUALIFIED SERVICE PERSONNEL.

1. Connect a UHF sweep generator to the UHF antenna terminals. Set the generator to sweep an 8 MC band, one megacycle below and above the standard frequency for the Channel to which the set is tuned. (Refer to the Frequency Chart on page 1953-519).

2. Connect the oscilloscope through the detector circuit of Fig. 518A to T.P. 401.

3. Adjust the trimmer, C-401, to produce the desired response curve with two equal peaks.



92X2008

Fig. 518B. Response Curve for Cascode I-F Alignment

ALIGNMENT FOR THE 1E1852 TV TUNER

The tuner was carefully aligned at the factory and should not require complete realignment under normal operating conditions. A slight readjustment of the individual oscillator slugs may be required as the tubes in the tuner age or are replaced. Use of selected tubes is recommended to obtain the best possible results without aligning the tuner. NO ATTEMPT TO REALIGN THE TUNER SHOULD BE MADE UNTIL THE BALANCE OF THE TV RECEIVER IS KNOWN TO BE IN PROPER OPERATING CONDITION AND IS PROPERLY ALIGNED.

EQUIPMENT REQUIRED

VHF Sweep Generator____RCA type WR-59B or equiv.
VHF Marker Generator __RCA type WR-39C or equiv.
Oscilloscope_____ RCA type WO-56A or equiv.
Bias source_____3 volt battery or equiv.

SET-UP PROCEDURE

1. Set the channel selector switch to Channel 10.

2. Connect the oscilloscope through a 10,000 ohm resistor to TP-9 shown in Fig. 518AA.

3. Connect the negative side of the bias source through a 1000 ohm isolation resistor to the terminal where the AGC lead (white wire) from the tuner is connected. Connect the positive side of the bias source to the receiver chassis.

4. Set the fine tuning control by placing widest point on cam on left side of shaft.

5. Connect the sweep generator to the antenna terminals through the pad shown in Fig. 518AB. and adjust the output to sweep channel 10.

6. Couple the output from the marker generator to the antenna circuit by connecting the hot lead from the generator to the junction of the four 220 ohms resistors in the pad shown in Fig. 518AB. Connect the ground lead to the r-f tube shield in the VHF tuner. Use minimum amount of signal from generator necessary to obtain good pip in scope pattern.

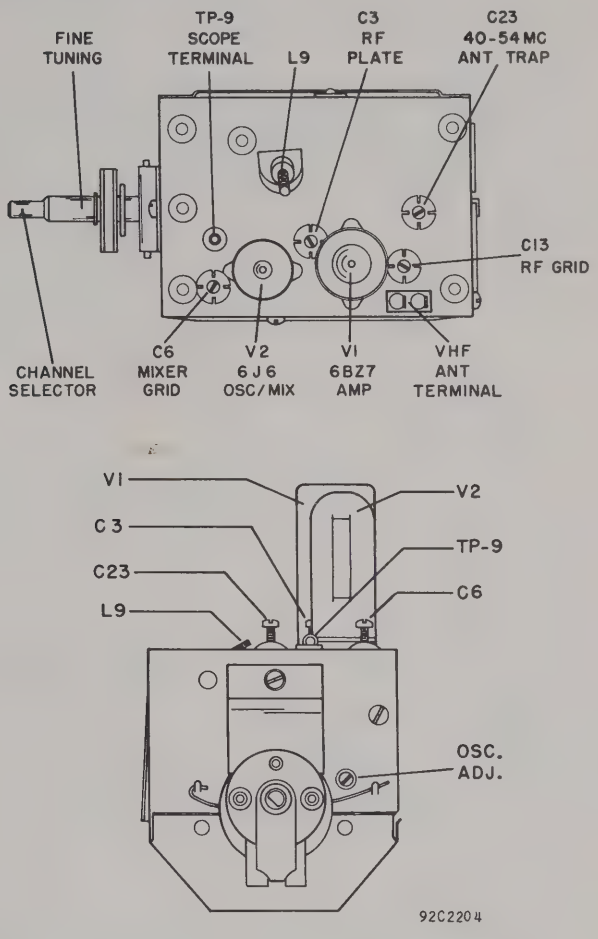


Fig. 518AA. Alignment Adjustments for 1E1852 TV Tuner

ANTENNA AND R-F CIRCUIT ADJUSTMENT

7. Adjust C-13, C-3, and C-6 for a flat-top response curve and maximum gain. Check the position of the markers on all channels. They should fall in place automatically on all channels. Correct marker frequencies for each channel are given in the Picture Carrier and Sound Carrier columns of the chart on page 1953-519. The response curves shown in Fig. 518BA. should be used as a guide to show the various shapes that the response curves may have and still be satisfactory. If necessary adjust C-25 (gimmick) to change bandwidth over a narrow range (approx. 2 mc.) on Channel 10. To increase bandwidth, push the gimmick closer to the contact terminals. CAUTION: This gimmick must not touch the tuner chassis as it is connected to the plate of the r-f stage.

8. Disconnect the bias source and test equipment.

9. Air check the receiver on all active VHF channels. If it is possible to receive a normal picture on all active channels by adjusting the fine tuning control, further alignment is not absolutely necessary.

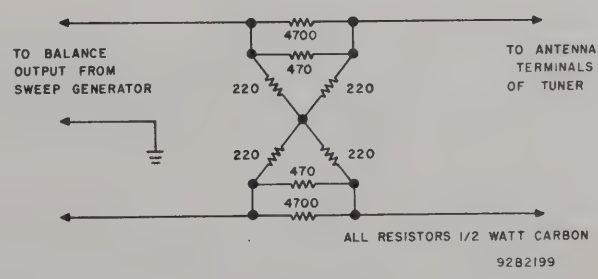


Fig. 518AB. Sweep Generator Pad

ALIGNMENT FOR THE 1E1852 TV TUNER (Cont.)

OSCILLATOR CIRCUIT ADJUSTMENT

1. Set the fine tuning control at the approximate midpoint of its tuning range.

2. Place a non-metallic screwdriver through the openings provided in the front of the chassis and the tuner assembly and adjust the oscillator coil slug for each active VHF channel to give best possible picture.

NOTE- Adjustment of the oscillator slugs may be accomplished on some models while the chassis is in the cabinet by removing the front knob escutcheon. An access hole for this adjustment is provided in the cabinets with removable front safety glass, but not in the knob escutcheons.

40 to 54 MC TRAP - The antenna input circuit of the VHF tuner contains a trap that may be adjusted to attenuate or eliminate interference within the range of 40 to 54 MC. If interference is encountered adjust C-23 on the top of the VHF tuner for minimum picture interference. Improper adjustment of this trap may affect the frequency response of channel 2. Care must be exercised that this does not happen.

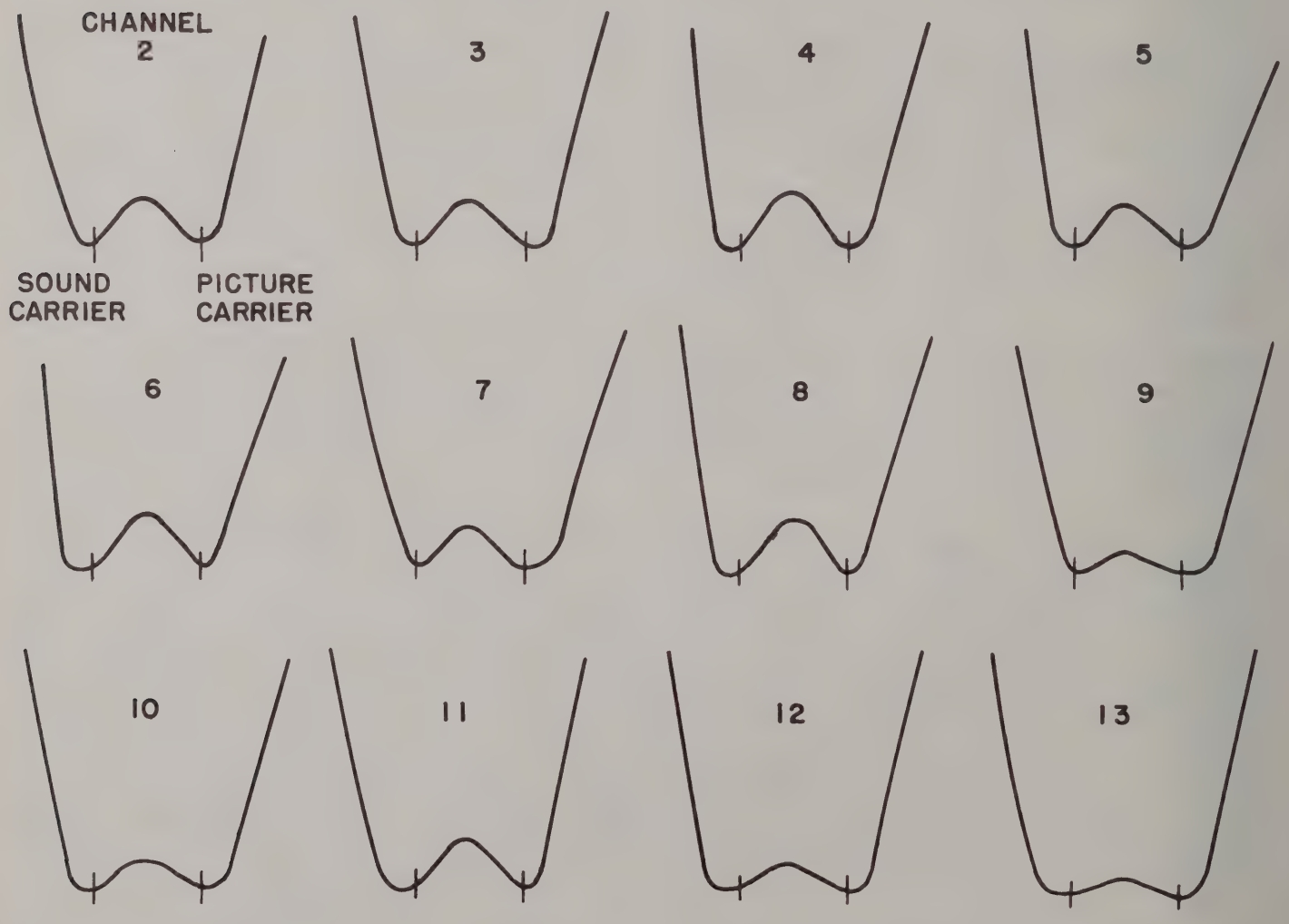


Fig. 518BA. Typical Response Curves for VHF Channels

VHF & UHF CHANNELS vs. CARRIER & OSCILLATOR FREQUENCIES FOR 45.75 TO 41.25 MC I.F. SYSTEMS

Channel Number	Channel Freq. (mc)	Picture Carrier Freq. (mc)	Sound Carrier Freq. (mc)	Receiver Oscillator Freq. (mc)
	VERY HIGH FREQUENCIES			
2	54-60	55.25	59.75	101
3	60-66	61.25	65.75	107
4	66-72	67.25	71.75	113
5	76-82	77.25	81.75	123
6	82-88	83.25	87.75	129
7	174-180	175.25	179.75	221
8	180-186	181.25	185.75	227
9	186-192	187.25	191.75	233
10	192-198	193.25	197.75	239
11	198-204	199.25	203.75	245
12	204-210	205.25	209.75	251
13	210-216	211.25	215.75	257
	ULTRA HIGH FREQUENCIES			
14	470-476	471.25	475.25	517
15	476-482	477.25	481.25	523
16	482-488	483.25	487.75	529
17	488-494	489.25	493.75	535
18	494-500	495.25	499.75	541
19	500-506	501.25	505.75	547
20	506-512	507.25	511.75	553
21	512-518	513.25	517.75	559
22	518-524	519.25	523.75	565
23	524-530	525.25	529.75	571
24	530-536	531.25	535.75	577
25	536-542	537.25	541.75	583
26	542-548	543.25	547.75	589
27	548-554	549.25	553.75	595
28	554-560	555.25	559.75	601
29	560-566	561.25	565.75	607
30	566-572	567.25	571.75	613
31	572-578	573.25	577.75	619
32	578-584	579.25	583.75	625
33	584-590	585.25	589.75	631
34	590-596	591.25	595.75	637
35	596-602	597.25	601.75	643
36	602-608	603.25	607.75	649
37	608-614	609.25	613.75	655
38	614-620	615.25	619.75	661
39	620-626	621.25	625.75	667
40	626-632	627.25	631.75	673
41	632-638	633.25	637.75	679
42	638-644	639.25	643.75	685
43	644-650	645.25	649.75	691
44	650-656	651.25	655.75	697
45	656-662	657.25	661.75	703
46	662-668	663.25	667.75	709
47	668-674	669.25	673.75	715
48	674-680	675.25	679.75	721
49	680-686	681.25	685.75	727
50	686-692	687.25	691.75	733
51	692-698	693.25	697.75	739
52	698-704	699.25	703.75	745
53	704-710	705.25	709.75	751
54	710-716	711.25	715.75	757
55	716-722	717.25	721.75	763
56	722-728	723.25	727.75	769
57	728-734	729.25	733.75	775
58	734-740	735.25	739.75	781
59	740-746	741.25	745.75	787
60	746-752	747.25	751.75	793
61	752-758	753.25	757.75	799
62	758-764	759.25	763.75	805
63	764-770	765.25	769.75	811
64	770-776	771.25	775.75	817
65	776-782	777.25	781.75	823
66	782-788	783.25	787.75	829
67	788-794	789.25	793.75	835
68	794-800	795.25	899.75	841
69	800-806	801.25	805.75	847
70	806-812	807.25	811.75	853
71	812-818	813.25	817.75	859
72	818-824	819.25	823.75	865
73	824-830	825.25	829.75	871
74	830-836	831.25	835.75	877
75	836-842	837.25	841.75	883
76	842-848	843.25	847.75	889
77	848-854	849.25	853.75	895
78	854-860	855.25	859.75	801
79	860-866	861.25	865.75	807
80	866-872	867.25	871.75	813
81	872-878	873.25	877.75	819
82	878-884	879.25	883.75	825
83	884-890	885.25	889.75	931

On all channels the Picture I-F frequency is 45.75 MC and the Sound I-F frequency is 41.25 MC which gives a difference between these two frequencies of 4.5 MC for the inter-carrier sound system.

92X1932

ALIGNMENT FOR 1E1670 & 1E1718 VHF 16 POSITION CASCODE TUNERS

These tuners have been carefully aligned at the factory by personnel using precision equipment. Minor adjustments of the tuner may be necessary after making tube or part replacements. When replacing tubes in a tuner use the same tube type as the original tube which was removed from the tuner and also try several different tubes and select the one which gives best performance. Realignment of the tuner probably will not be required if a selected tube is used for replacement. For those service engineers who are properly equipped as specified, the following alignment procedure is included. DO NOT ATTEMPT TUNER ALIGNMENT UNTIL THE TV RECEIVER IS KNOWN TO BE FUNCTIONING PROPERLY AND THE I-F ALIGNMENT OF THE RECEIVER IS CORRECT.

EQUIPMENT REQUIRED FOR VHF TUNER ALIGNMENT

Sweep Generator	RCA type WR-59B or equiv.
Marker Generator	RCA type WR-39C or equiv.
Oscilloscope	RCA type WO-56A or equiv.
Bias Source	$1\frac{1}{2}$ volt battery or equiv.
Detector Circuit	See Fig. 518A
Isolation Transformer	150 watt rating or higher

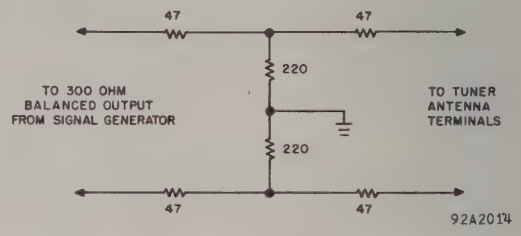


Fig. 520A. Sweep Generator 300 Ohm Pad

OSCILLATOR ADJUSTMENT FOR 16 POSITION TUNERS

1. Connect the balanced sweep output from a signal generator to the VHF tuner antenna terminals through the 300 ohm pad shown in Fig. 520A. Set sweep generator for 20 MC or maximum sweep.

2. Connect the negative side of $1\frac{1}{2}$ volt bias supply through a 1000 ohm resistor to terminal 8 of the VHF tuner. Connect the positive side of the bias supply to the chassis.

3. Connect the oscilloscope and band-pass detector circuit shown in Fig. 518A to Test Point TP-2 shown in Fig. 521B.

4. Set the VHF tuner channel selector to channel 13.

5. Loosely couple the high side of the marker generator to the antenna input terminals by clipping the lead over the insulation of one sweep generator lead. Connect the ground side of the generator to the chassis of the VHF tuner. Set the marker generator to the channel 13 picture carrier frequency of 211.25 MC.

6. Carefully note the position of the marker pip on the response curve. Use a grease pencil if necessary to mark the position on the face of the cathode ray tube.

7. Loosely couple the high side of the marker generator to the band-pass detector circuit by clipping the lead over the germanium diode in the detector circuit. Connect the ground side of the generator to the chassis of the VHF tuner. • Set the marker generator to 45.75 MC.

8. Rotate the fine tuning control of the VHF tuner until the 45.75 MC marker is in the same spot as the marker in steps 5 and 6. If this cannot be accomplished by adjustment of the fine tuning control, adjust the channel 13 oscillator adjustment (L-7) to position the 45.75 MC marker. DO NOT DISTURB THE SETTING OF THE FINE TUNING CONTROL AFTER THIS ADJUSTMENT.

9. Switch the VHF tuner channel selector and sweep generator to channel 12.

10. Repeat steps 5 and 6 except use the picture carrier frequency for channel 12 (205.25 MC) in step 5.

11. Repeat step 7 using the same marker frequency of 45.75 MC.

12. Adjust the incremental oscillator coil for the channel until the 45.75 MC marker pip is in the same position on the curve as the marker pip for the picture carrier was in step 10.

13. Repeat steps 9, 5, 6, 7 and 12 for channels 11, 10, 9, 8 and 7 in that order. In each case switch the channel selector and sweep generator to the channel being aligned. The marker generator frequency for step 5 will be the picture carrier frequency for the channel being aligned. See the chart on page 1953-519 for the picture carrier frequency of each channel:

14. Switch the channel selector and sweep generator to channel 6 and repeat steps 5 and 6 except use the picture carrier frequency for channel 6 (83.25 MC) in step 5.

15. Repeat step 7 using the same marker frequency of 45.75 MC.

16. Adjust the channel 6 oscillator adjustment until the 45.75 MC marker pip is in the same position on the curve as the marker pip in step 14. See Fig. 521B.

17. Repeat step 9, 5, 6, 7 and 12 for channels 5, 4, 3 and 2 in that order. In each case switch the channel selector and sweep generator to the channel being aligned. The marker generator frequency for step 10 will be the picture carrier frequency for the channel being aligned. See the chart on page 1953-519 for the picture carrier frequency of each channel.

NOTE: If two marker generators are available the alignment can be greatly simplified by using one generator for the picture carrier marker and the other for the 45.75 MC marker. Both generators are connected to the receiver at all times as directed in the above instructions. The use of two generators will produce two pips on the pattern. The adjustments outlined above will make these two pips coincide on the oscilloscope pattern.

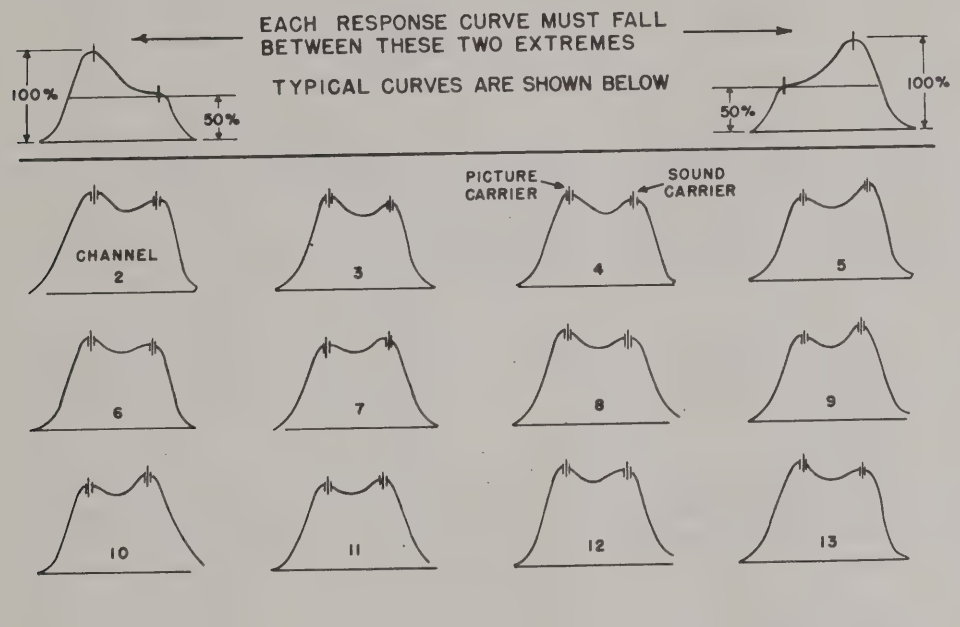


Fig. 521A. 16 Position VHF Tuner Typical Channel Response Curves

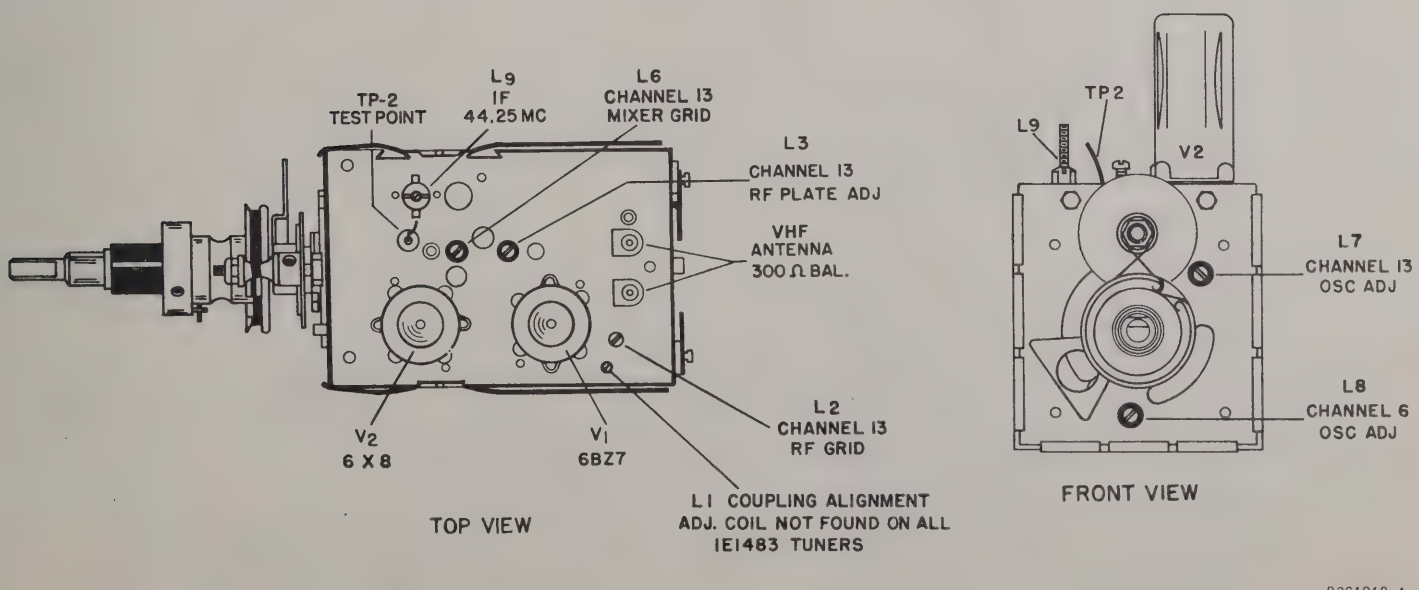


Fig. 521B. Alignment Adjustments for 1E1670 or 1E1718 Tuners

BAND-PASS ALIGNMENT FOR 16 POSITION VHF TUNERS 1E1670 & 1E1718

DO NOT ATTEMPT THIS ALIGNMENT UNTIL THE I-F ALIGNMENT OF THE RECEIVER HAS BEEN CHECKED AND IS KNOWN TO BE CORRECT. THE OSCILLATOR ADJUSTMENT PROCEDURE GIVEN ON PAGE 1953-520 MUST ALSO BE COMPLETED BEFORE STARTING THIS ALIGNMENT.

1. Connect the balanced sweep output from a signal generator to the VHF tuner antenna terminals through the 300 ohm pad shown in Fig. 520A. Set the sweep generator for 20 MC or maximum sweep.

2. Connect the negative side of the $1\frac{1}{2}$ volt bias supply through a 1000 ohm resistor to terminal 8 of the VHF tuner. Connect the positive side of the bias supply to the chassis.

3. Connect the oscilloscope and band-pass detector circuit shown in Fig. 518A to Test Point TP-2 shown in Fig. 521B.

4. Set the VHF tuner channel selector to channel 13.

5. Loosely couple the high side of the marker generator to the band-pass detector circuit by clipping the lead over the germanium diode in the detector circuit. Connect the ground side of the generator to the chassis of the VHF tuner.

6. Set the sweep generator for channel 13 and turn the VHF tuner channel selector to channel 13.

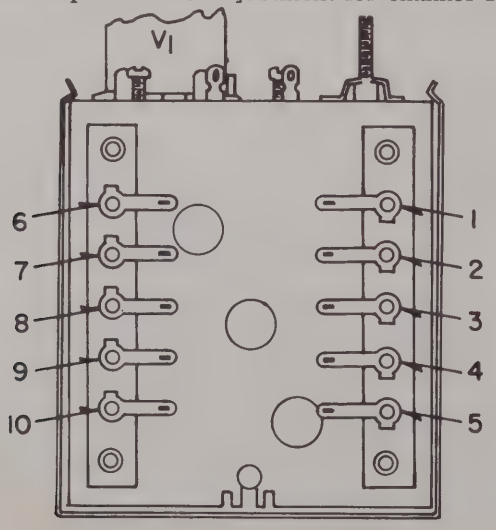
7. Adjust L-2 (channel 13 r-f grid), L-3 (channel 13 r-f plate), and L-6 (channel 13 mixer grid) adjusting screws (see Fig. 521B) for a band pass characteristic containing both carriers with steep sides and maximum gain. See curves shown on page 1953-521. The r-f grid adjustment (L-2) must be adjusted for maximum mid-band gain regardless of the shape of the skirts. The slope and position of the skirts are primarily controlled by the r-f plate adjustment (L-3) while the mixer grid adjustment (L-6) controls the slope of the flat topped portion of the curve. Always adjust to place the picture carrier marker on a peak of the curve.

If the factory adjustment of the incremental loops and coils has not been disturbed, alignment of the r-f plate, r-f grid and mixer grid should be complete after the completion of step 7, unless extensive repairs have been made on the tuner. Check the other channels for a similar band-pass characteristic as shown in Fig. 521A. If they have the correct characteristics further alignment is not necessary. If they do not, proceed with the following steps.

8. Adjust the coils of the r-f plate, r-f grid and mixer grid for channels 12 through 7 starting with channel 12. Adjust the signal generators for each channel to the frequencies given in the chart on page 1953-519. Pushing the half turn incremental loops toward the center of the switch so that they are closer to the switch wafer will increase the frequency while pulling them out and away from the switch wafer will decrease the frequency. Always adjust the r-f grid coils for maximum mid-band gain and the r-f plate and mixer grid coil loops as outlined in step 7.

9. Adjust the coils of the r-f plate, r-f grid and mixer grid for channels 6 through 2 starting with channel 6. Adjust the signal generators for each channel to the frequencies given in the chart on page 1953-519. Spreading the turns of the coils will increase the frequency while squeezing the turns together will decrease the frequency. Always adjust the r-f grid coils for maximum mid-band gain and the r-f plate and mixer grid coil loops as outlined in step 7.

10. Repeat step 7 as final adjustment for channel 13.



92B1794-1

Fig. 522A. Numbering of Tuner Terminals

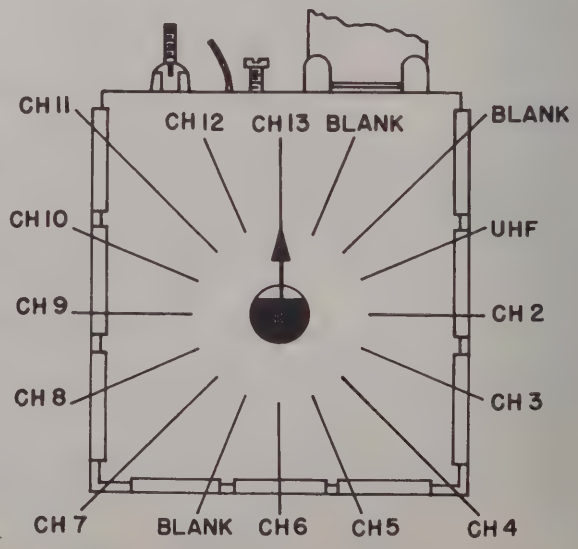


Fig. 522B. Channel Selector Switch Positions

ALIGNMENT FOR 1C1717 CASCODE TUNERS

These tuners have been carefully aligned at the factory by personnel using precision equipment. Minor alignment adjustments of the tuner may be necessary after making tube or part replacements. When replacing tubes in a tuner use the same tube type as the original tube which was removed from the tuner and also try several different tubes and select the one which gives best performance. Realignment of the tuner probably will not be required if a selected tube is used for replacement. Use of an alternate tube may require a complete realignment of the TV tuner. For those service engineers who are properly equipped as specified, the following alignment procedure is included. Balance of TV receiver must be functioning properly before aligning tuner.

EQUIPMENT REQUIRED FOR TV TUNER ALIGNMENT

1. Sweep generator _____ RCA type WR-59B or equiv.
2. Marker Generator _____ RCA type WR-39C Television Calibrator or equivalent.
3. Oscilloscope _____ RCA type WO-56A or equiv.
4. Bias Source _____ 1.5 volt battery.
5. Isolation Transformer _____ 150 watt rating or higher

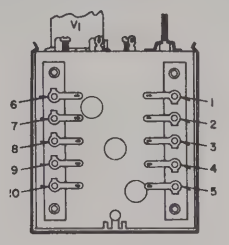


Fig. 522AA. Numbering of Tuner Terminals

SET-UP PROCEDURE FOR TUNER ALIGNMENT

1. Check to be sure that the tube shields and the bottom cover for the tuner are in place.
2. Connect all test equipment and the television chassis to a common ground. Be sure to use an isolation transformer for the receiver chassis. Allow at least a 5 minute warm-up period for the receiver chassis.
3. Connect the negative terminal of a 1.5 volt bias source through a 1,000 ohm resistor to terminal 8 of the TV tuner. See Fig. 522AA for terminal numbering. Connect the positive side of the bias source to any convenient ground point on the chassis.
4. Connect the hot lead from the oscilloscope through a 10,000 ohm carbon resistor to test point T.P.-1. See figure 522AB. Connect the ground lead from the oscilloscope to any convenient ground point on the TV tuner chassis. Set the scope sweep oscillator to roughly 120 cycles.

OSCILLATOR ADJUSTMENT

1. Turn the channel selector to channel 13.
2. Set the marker generator to 257 mc. and connect generator leads to the antenna terminals.
3. Rotate the fine tuning control until a zero beat is indicated on the scope. When the fine tuning control is rotated a band will appear across the face of the scope. As the point of zero beat is approached this band will increase in amplitude and then decrease sharply until a minimum is reached which is the point of zero beat. If the fine tuning control is rotated farther in the same direction the amplitude of the band will increase sharply and then decrease. The point of zero beat should fall in the approximate center of the range over which the fine tuning control may be rotated. If it does not, set the fine tuning control at the approximate center of its range and adjust L-7 (Channel 13 Oscillator Adjustment) for the zero beat. Do not disturb the setting of the fine tuning control after this adjustment.
4. Set the channel selector to channel 6.
5. Set the marker generator to 129 mc.
6. Adjust L-8 (Channel 6 Oscillator Adjustment) for the zero beat indication on the scope.

NOTE: Adjustment of the channel 13 and channel 6 oscillator coils automatically brings all other channel into adjustment. The adjustment screws cover their entire electrical range within eight full revolutions counterclockwise from the tight position. Any further rotation of these screws may cause them to fall out. Counterclockwise rotation of the screws will decrease the oscillator frequency. Best results will be obtained if a non-metallic screwdriver is used.

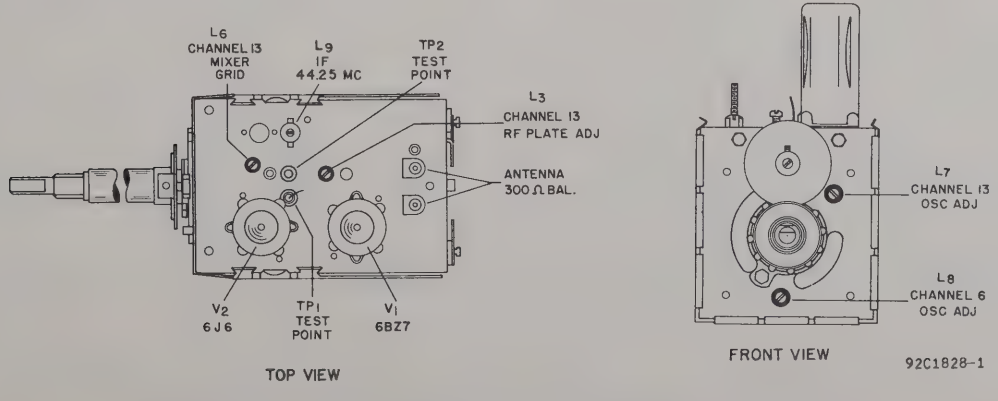


Fig. 522AB. 1C1717 Cascode TV Tuner Alignment Adjustments

BAND PASS ALIGNMENT OF 1C1717 TV TUNERS

CAUTION: Band pass alignment is carefully made at the factory. Attempt this alignment only with proper equipment and set-up. The tube shields and the bottom cover for the tuner must be in place. The oscillator adjustment given on page 1953-522A must be completed before the band pass alignment is started.

1. Complete the set-up procedure given on page 1953-522A.

2. Connect the leads from the sweep and marker generators to the tuner antenna terminals.

3. Turn the channel selector to channel 13. Adjust the generators to the correct frequencies for channel 13 as shown in the chart on page 1953-519.

4. Adjust L-3 (channel 13 rf plate), and L-6 (channel 13 mixer grid) adjusting screws (see Fig. 522AB) for a band pass characteristic containing both carriers with steep sides and maximum gain.

If the factory adjustment of the incremental loops and coils has not been disturbed, alignment on the rf plate, rf grid, and mixer grid should be complete after the completion of step 4 unless extensive repairs have been made on the tuner. Check the other channels for a similar band pass characteristic as shown in Fig. 522BA. If they have the correct characteristics further alignment is not necessary. If they do not, repeat step 4 and adjust L-2 by spreading or compressing the turns of the coil before continuing with steps 5 and 6.

5. Adjust the coils of the rf plate, rf grid, and mixer grid for channels 12 through 7 starting with channel 12. Adjust the signal generators for each channel to the frequencies given in the chart on page 1953-519. Pushing the half turn coil loops towards the center of the switch so that they are closer to the switch wafer will increase the frequency while pulling them out and away from the switch wafer will decrease the frequency. Adjust for a band pass characteristic containing both carriers with steep sides and maximum gain.

6. Adjust the coils of the rf plate, rf grid, and mixer grid for channels 6 through 2 starting with channel 6. Adjust the signal generators for each channel to the frequencies given in the chart on page 1953-519. Spreading the turns of the coils will increase the frequency while squeezing the turns together will decrease the frequency. Adjust for a band pass characteristic containing both carriers with steep sides and maximum gain. A tuning wand may be used to determine what change is necessary.

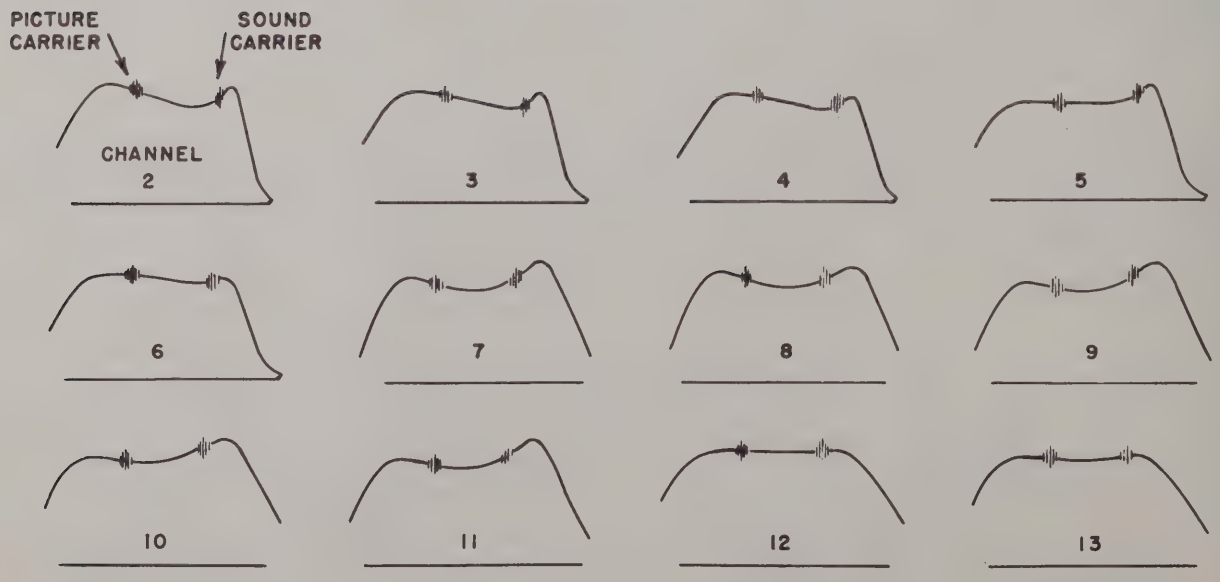


Fig. 522BA. Typical Channel Response Curves for TV Tuners

ALIGNMENT OF THE 1E1660 AND 1E1855 UHF TUNERS

These tuners have been carefully aligned at the factory by personnel using precision equipment. Minor adjustments of the tuner may be necessary after making tube or part replacement. When replacing tubes in a tuner use the same tube type as the original tube which was removed. It is advisable to try several tubes and select the one that gives the best performance. Realignment of the tuner will probably not be required if a selected tube is used for replacement. For those service engineers who are properly equipped as specified, the following alignment procedure is included. DO NOT ATTEMPT THIS PROCEDURE UNTIL THE TV RECEIVER IS KNOWN TO BE FUNCTIONING PROPERLY AND THE I-F ALIGNMENT IS CORRECT.

THE HALLICRAFTERS SERVICE DEPARTMENT PROVIDES A TUNER EXCHANGE SERVICE FOR A NOMINAL FEE. THE SERVICE TECHNICIAN IS URGED TO AVAIL HIMSELF OF THAT SERVICE RATHER THAN TO ATTEMPT FIELD ALIGNMENT OF THESE TUNERS.

OSCILLATOR ALIGNMENT

Step	Signal Generator Connection	Frequency	Output Connection	Adjust	Comments
1	Through circuit of Fig. 522CA to junction of L304 & L305 (1E1660) or diode clip nearest oscillator section (1E1885)	945.0 mc. or 475.5 mc. (2nd. harmonic) or 236.25 mc. (4th harmonic)	Detector network of Fig. 522CB to T.P. 401 on Cascode amplifier. Output of detector to Vertical Input of Score.	C-309 for zero beat on scope, signal tracer, or hi gain audio amp.	With VHF/UHF switch in UHF position set UHF Tuner rotor to full clockwise position (maximum freq.). Use a long screwdriver through hole in Tuner cradle. Use only sufficient output from Signal Generator to give zero beat. Large Signal Generator output may cause UHF oscillator to "pull" and mixer crystal to burn out.
2	Through circuit of Fig. 522CA to junction of L304 & L305 (1E1660) or diode clip nearest oscillator section (1E1855)	504.0 mc. or 252.0 mc. (2nd. harmonic) or 126.0 mc. (4th harmonic)	Detector network of Fig. 522CB to T.P. 401 on Cascode amplifier. Output of detector to Vertical Input of Scope.	See comments.	With VHF/UHF switch in UHF position set UHF Tuner rotor to full counterclockwise position (minimum freq.) **1E1660** Zero beat must occur at 504.0 mc. ± 3 MC. If it does not, repeat step 1 with new 6J6 tube. **1E1855** Adjust C305 for zero beat at 504.0 mc. Repeat steps 1 and 2 until satisfactory. After completing alignment, replace crystal shield.

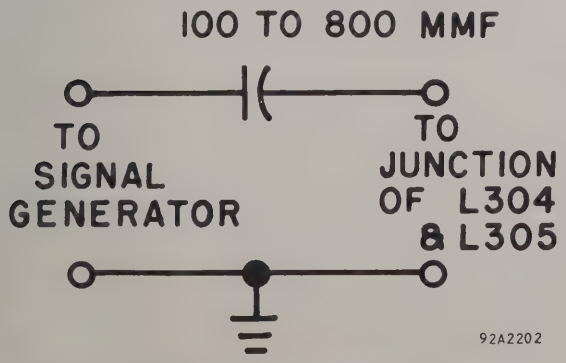


Fig. 522CA. Sweep Generator Coupling

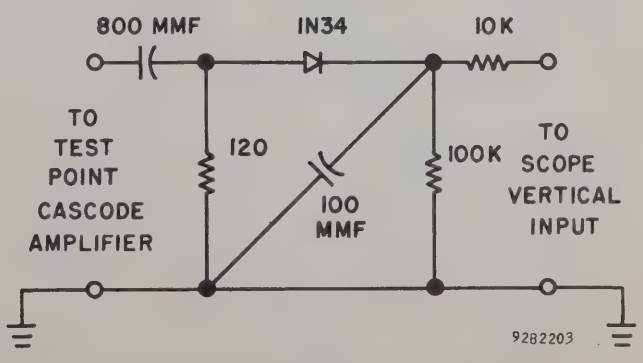


Fig. 522CB. Detector Circuit

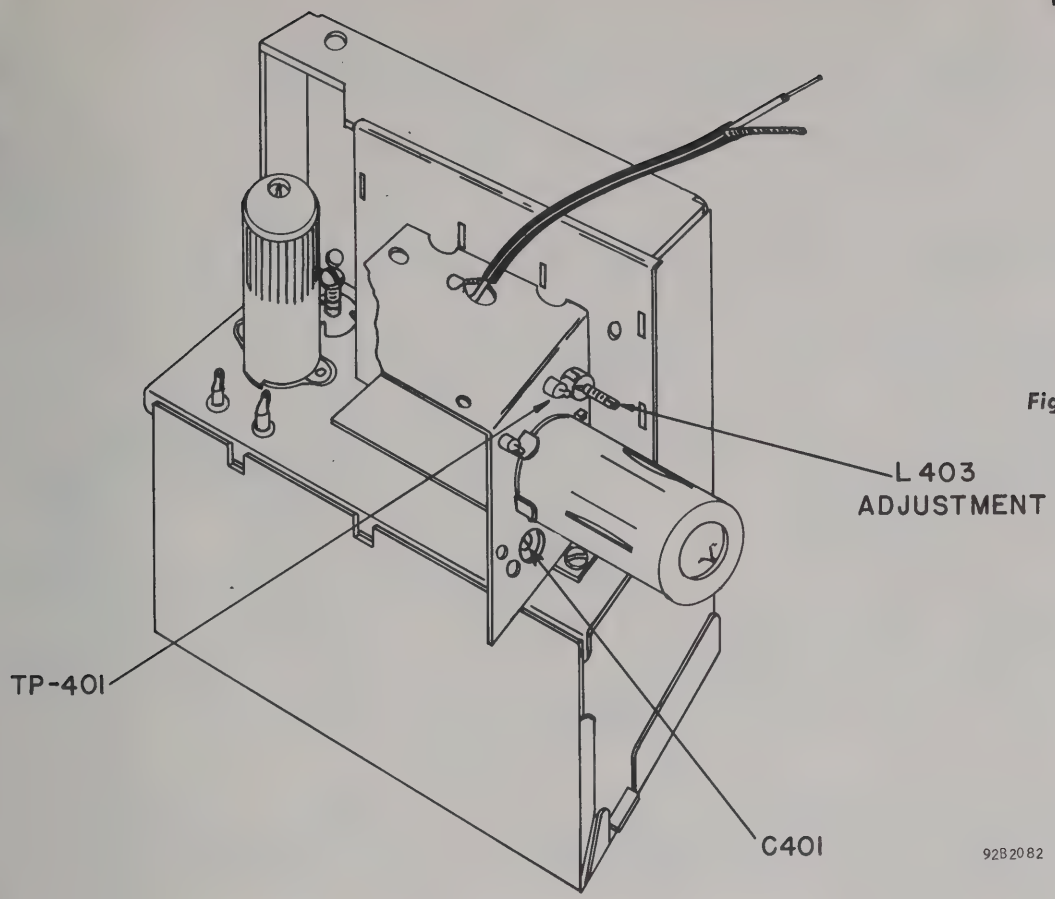


Fig. 523A. Alignment Adjustments for 1E1660 UHF Tuner with Cascode Amplifier

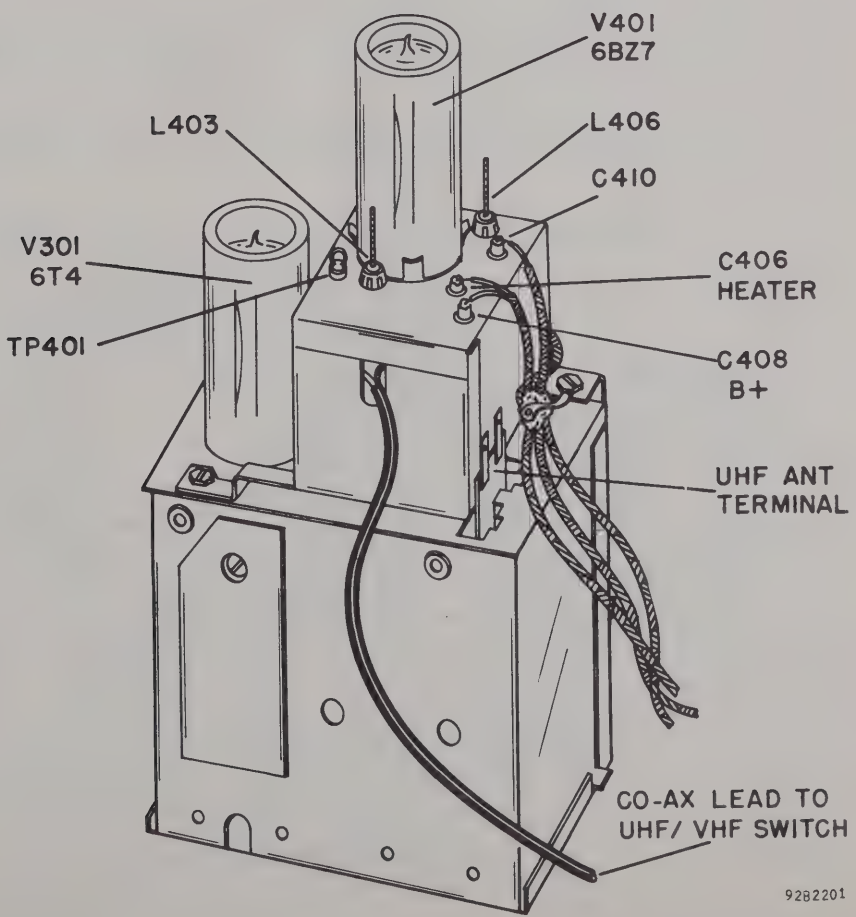


Fig. 523B. Alignment Adjustments for 1E1855 UHF Tuner with Cascode Amplifier

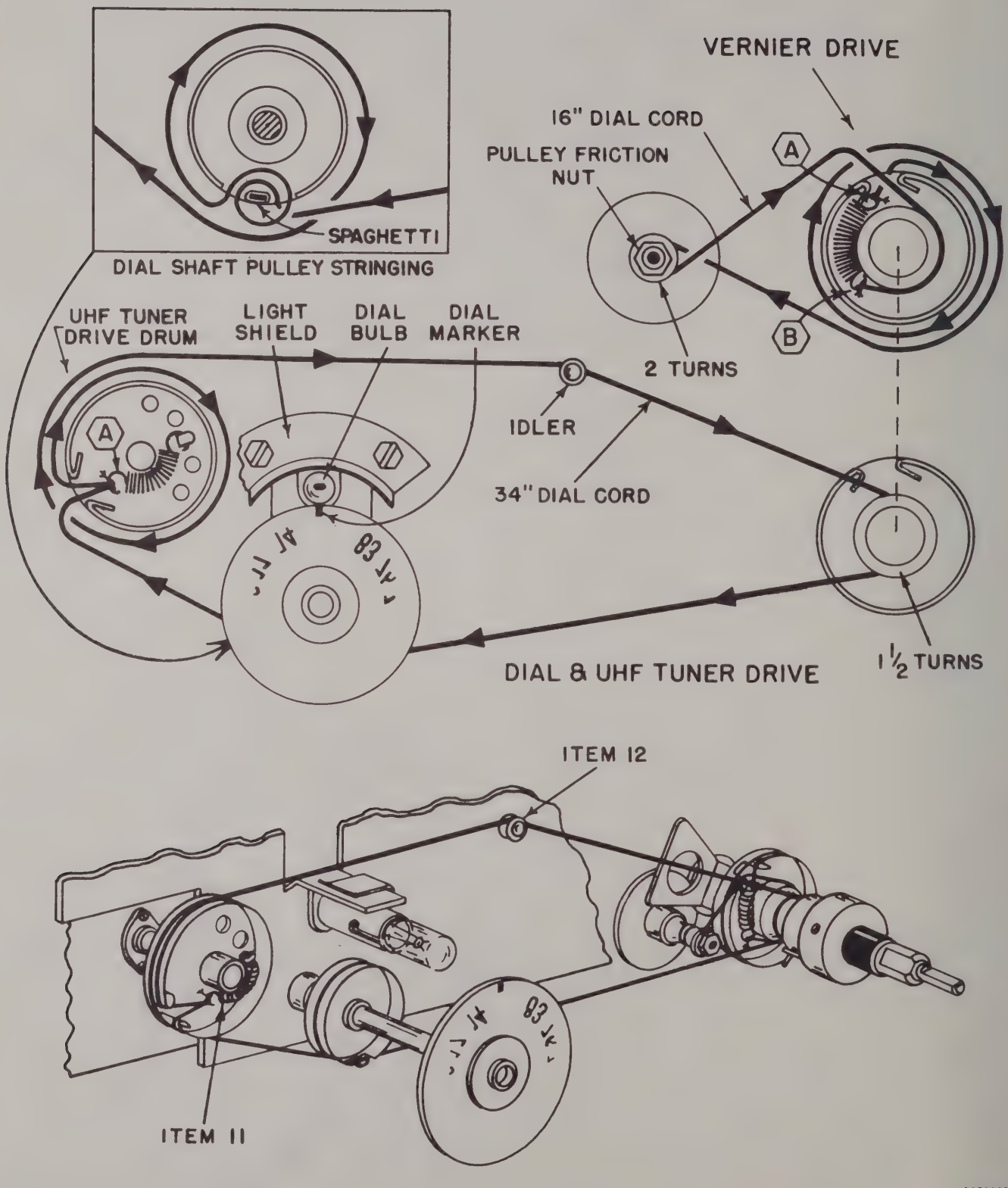


Fig. 524A. 1E1660 UHF Tuner Drive Mechanism Stringing

STRINGING & ADJUSTMENT OF VERNIER DRIVE, DIAL & UHF TUNER DRIVE

STRINGING VERNIER DRIVE

Tie one end of a 16" or longer dial cord to tension spring at "A" and position the spring as shown in Fig. 524A so that a slight tension on the dial cord will hold the spring in place.

Pass cord around pulleys as shown in Fig. 524A in the direction indicated by the arrows. Maintain a slight tension on the free end of the cord and rotate the large pulley counterclockwise to the position shown in Fig. 524A.

Tie the free end of the dial cord to the tension spring at "B" after stretching the spring.

Place a drop of quick drying cement on the knots to prevent them from working loose.

STRINGING UHF TUNER DRIVE AND DIAL

Set UHF tuner drive drum and vernier drive fully counterclockwise as shown in Fig. 524A.

Tie one end of a 34" or longer dial cord to tension spring at "A" and hook other end of spring on the pulley, stretch the spring and pass the cord around pulleys as shown in Fig. 524A in the direction indicated by the arrows until the dial shaft pulley is reached.

Carefully set the position of the dial so that the dial marker is directly above the center of the shaft as shown in Fig. 524A. Pass dial cord around spaghetti covered pin through notches in pulley rim and take one turn around pulley before passing free end of cord through notch in drive drum pulley and tying to the tension spring at "A". Cement knots to prevent them from working loose.

ADJUSTMENT OF PULLEY FRICTION NUT

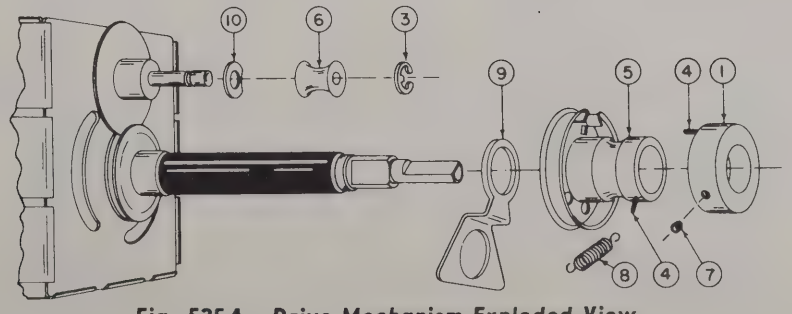
The vernier drive is designed with a fast and slow tuning speed. During slow speed tuning the friction nut must be tightened so that the friction developed by the spring washer will not allow the idler pulley (Item 6, Fig. 525A) to slip. If it does slip, it will not be possible to accurately tune in a UHF station.

During high speed tuning the idler pulley must slip. If the friction nut is set too tight the dial cord will slip on the idler pulley causing excessive cord wear necessitating frequent cord replacement. The dial will also be hard to turn.

SERVICE PARTS LIST FOR UHF TUNER VERNIER DRIVE MECHANISM

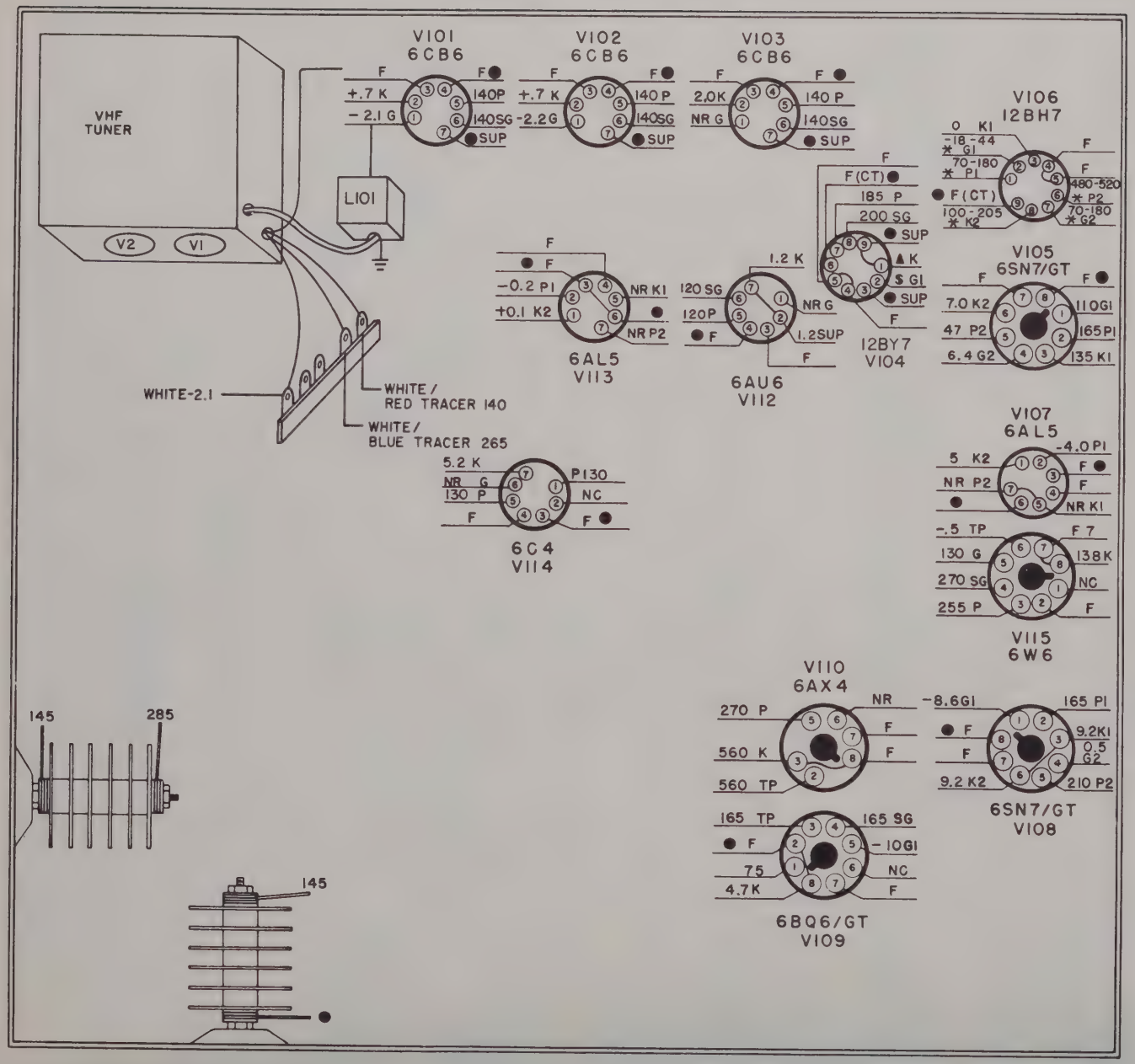
The items in the following parts list are identified in Fig. 525A, except items 11 & 12 shown in Fig. 524A, by means of the item numbers. WHEN ORDERING REPLACEMENT PARTS ORDER BY PART NUMBER ONLY.

ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.
1	Collar	77A615	7	Screw, set; 6-32 x $\frac{1}{2}$" bristol	3A1803
2	Dial shaft & pulley assembly	28B154	8	Spring, drive string tension	75A163
3	E ring	76A1075	9	Stop, pulley	67A2225
4	Pin, stop	74A586	10	Washer, spring	4A1557
5	Pulley and idler assembly	28B149	11	Spring, drive string tension	75A173
6	Pulley, idler	28A139	12	Pulley, idler	28A021



92B2125

Fig. 525A. Drive Mechanism Exploded View



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. BRIGHTNESS CONTROL MAXIMUM
3. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
4. ALL OTHER CONTROLS SET FOR NORMAL-RASTER.
5. LINE VOLTAGE 117 V 60 ∿ AC.
6. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
7. ALL READINGS TAKEN WITH A VTVM.

KEY

✱ DEPENDS UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS.

TP TIE POINT.

NC NO CONNECTION.

NR NOT READABLE.

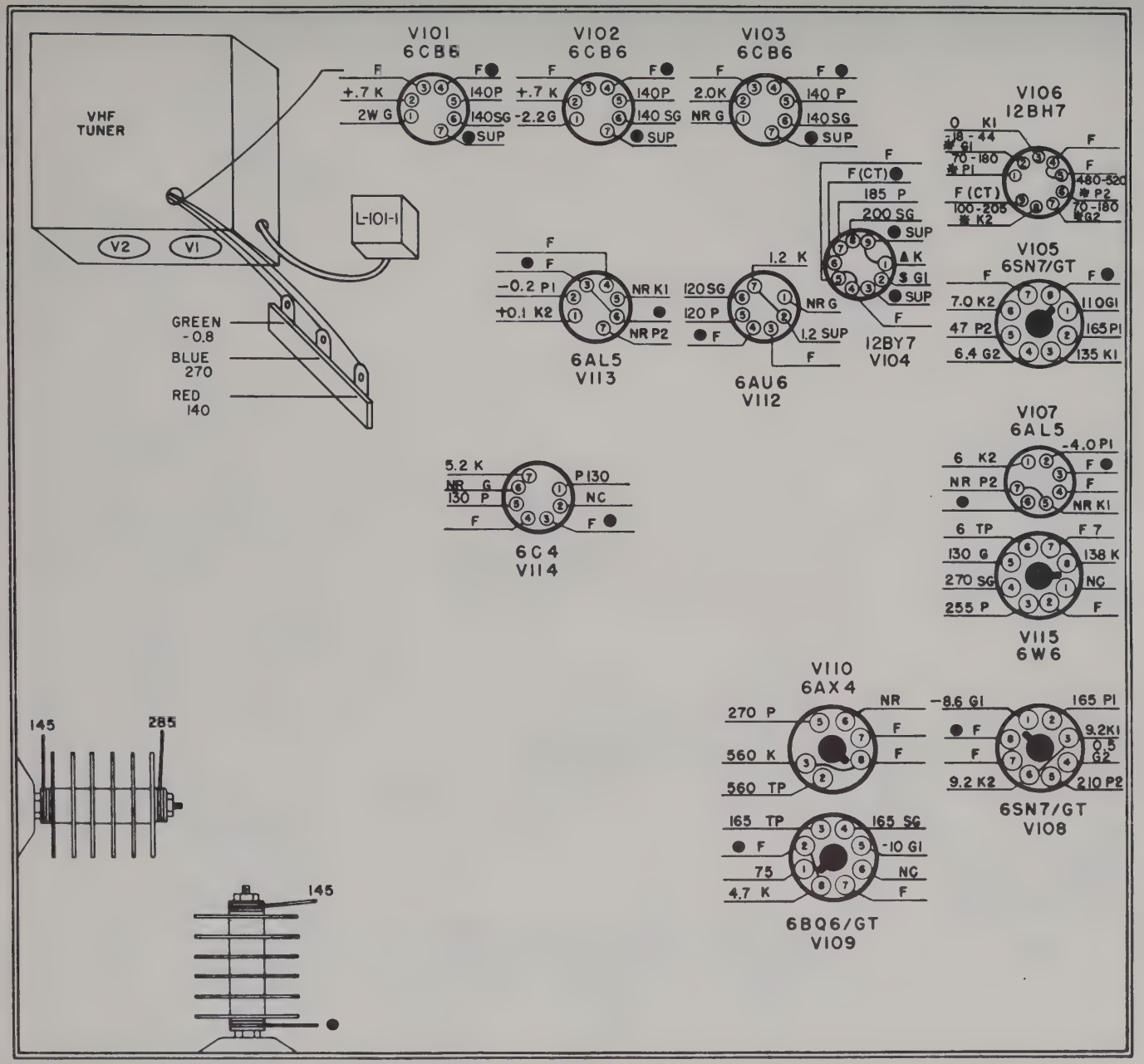
▲ VARIES FROM 3 TO 34 V. DEPENDING ON SETTING OF CONTRAST CONTROL.

$ VARIES FROM 0-16 V DEPENDING ON SETTING OF CONTRAST CONTROL.

92C2120-1

9AX1198-1
1053

Fig. 526A. Voltage Chart for Chassis A1300D & E1300D (Run 1)



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. BRIGHTNESS CONTROL MAXIMUM
3. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
4. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
5. LINE VOLTAGE 117 V 60 ∿ AC.
6. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
7. ALL READINGS TAKEN WITH A VTVM.

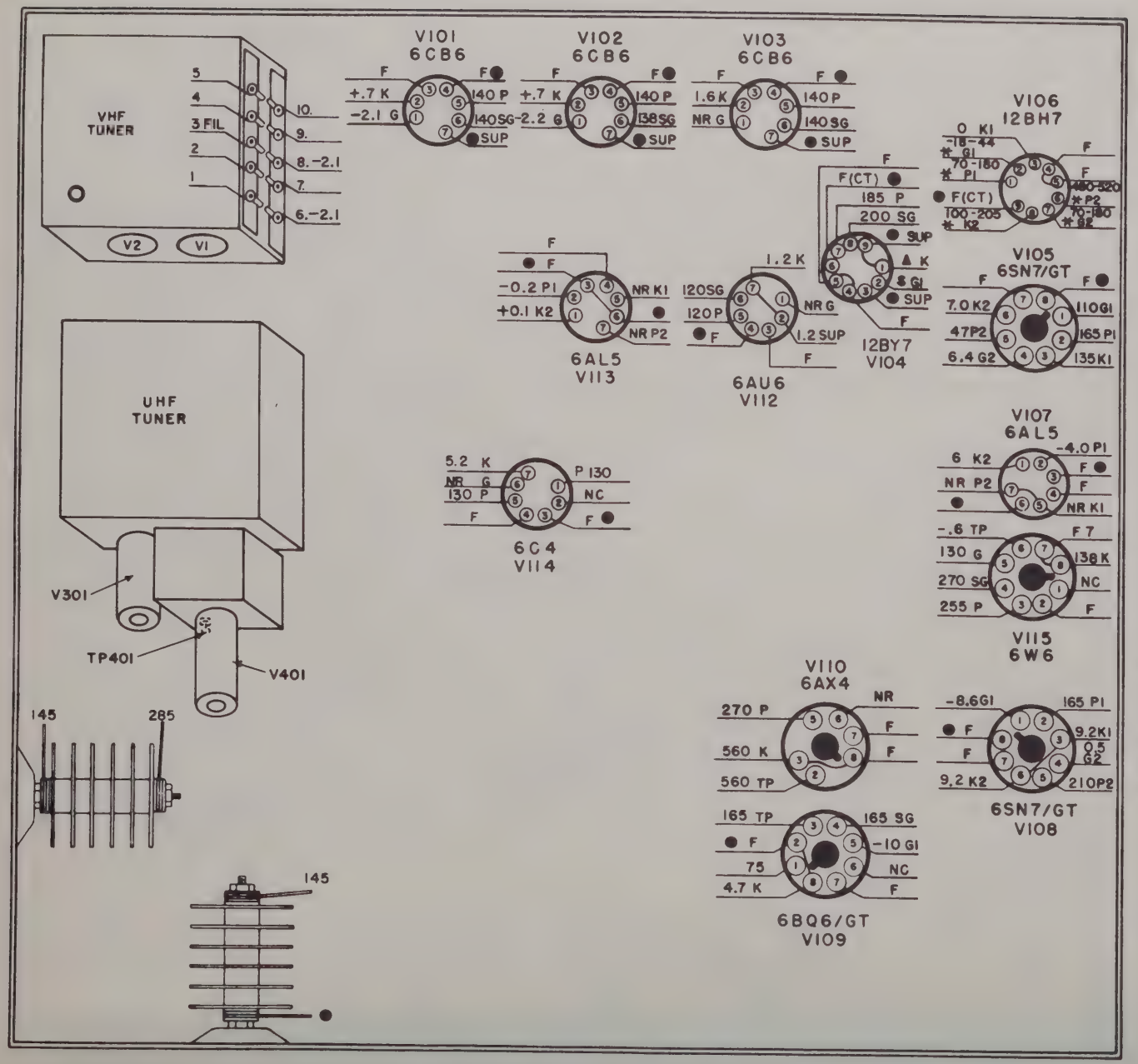
KEY

- ✳ DEPENDS UPON THE SETTING OF THE HEIGHT CONTROL.
- ● INDICATES GROUND LUGS

TP TIE POINT.
NC NO CONNECTION.
NR NOT READABLE.
■ NC OR READING ON 16 POSITION TUNERS
▲ VARIES FROM 3 TO 24 V. DEPENDING ON SETTING OF CONTRAST CONTROL.
$ VARIES FROM 0-16 V DEPENDING ON SETTING OF CONTRAST CONTROL.

92C2205

Fig. 526AA. Voltage Chart for Chassis A1300D & E1300D (Run 2)



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. BRIGHTNESS CONTROL MAXIMUM.
3. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
4. ALL OTHER CONTROLS SET OR NORMAL RASTER.
5. LINE VOLTAGE 117 V 60 ∿ AC.
6. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
7. ALL READINGS TAKEN WITH A VTVM.
8. CHANNEL SELECTOR SET TO UHF.

KEY

* DEPENDS UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS.

TP TIE POINT.

NC NO CONNECTION.

NR NOT READABLE.

▲ VARIES FROM 3 TO 34V. DEPENDING ON SETTING OF CONTRAST CONTROL.

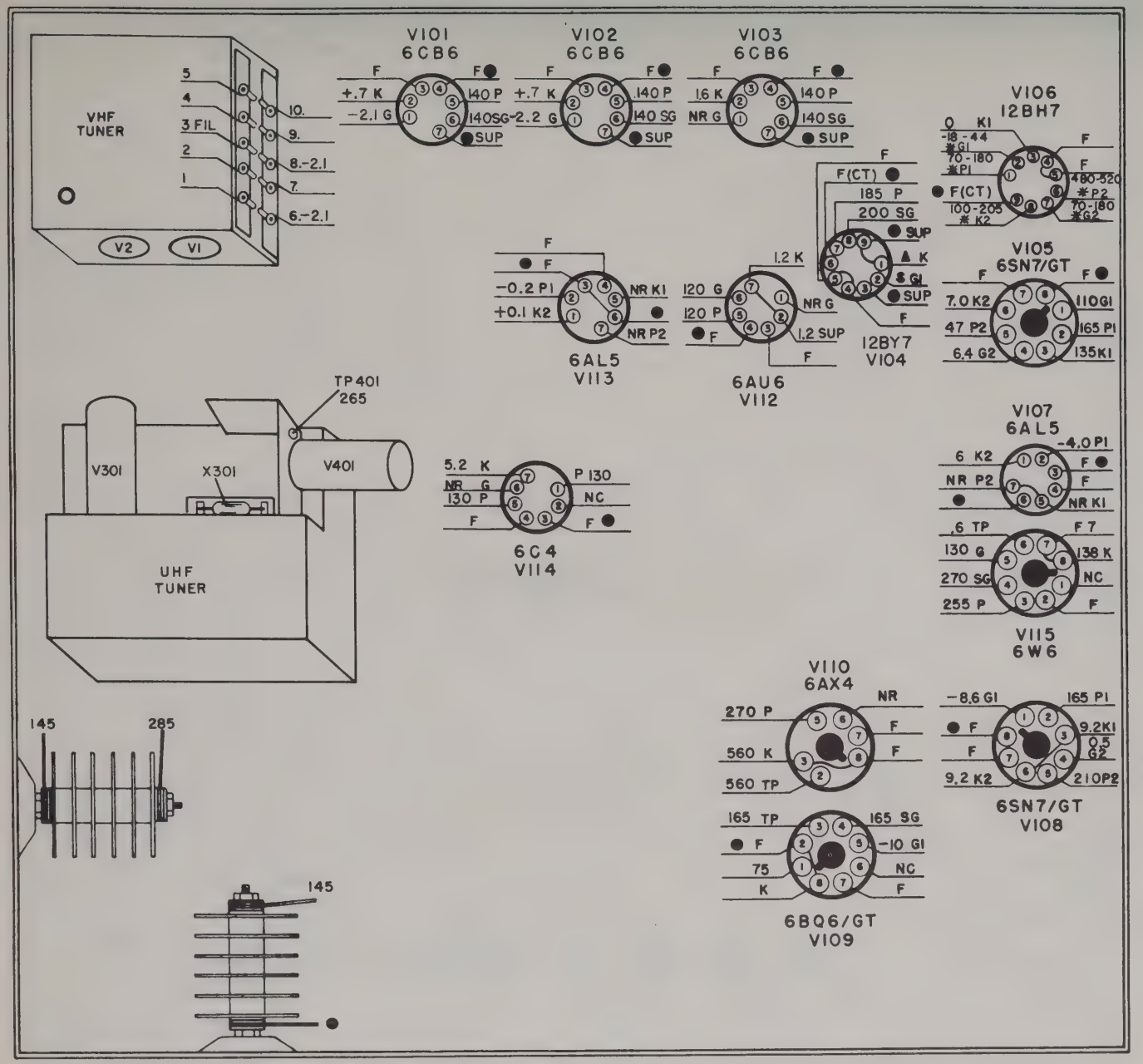
$ VARIES FROM 0-16 V. DEPENDING ON SETTING OF CONTRAST CONTROL.

○ FOR VOLTAGES OF VHF TUNER ON VHF SEE PAGE 1953-528.

92C2206

Fig. 526BA. Voltage Chart for Chassis B1300D & F1300D (Run 2)

94X1198-1
1053



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. BRIGHTNESS CONTROL MAXIMUM.
3. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
4. ALL OTHER CONTROLS SET OR NORMAL RASTER.
5. LINE VOLTAGE 117 V 60 ∿ AC.
6. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
7. ALL READINGS TAKEN WITH A VTVM.
8. CHANNEL SELECTOR SET TO UHF

KEY

* DEPENDS UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS.

TP TIE POINT.

NC NO CONNECTION.

NR NOT READABLE.

■ NC OR READING ON 16 POSITION TUNERS

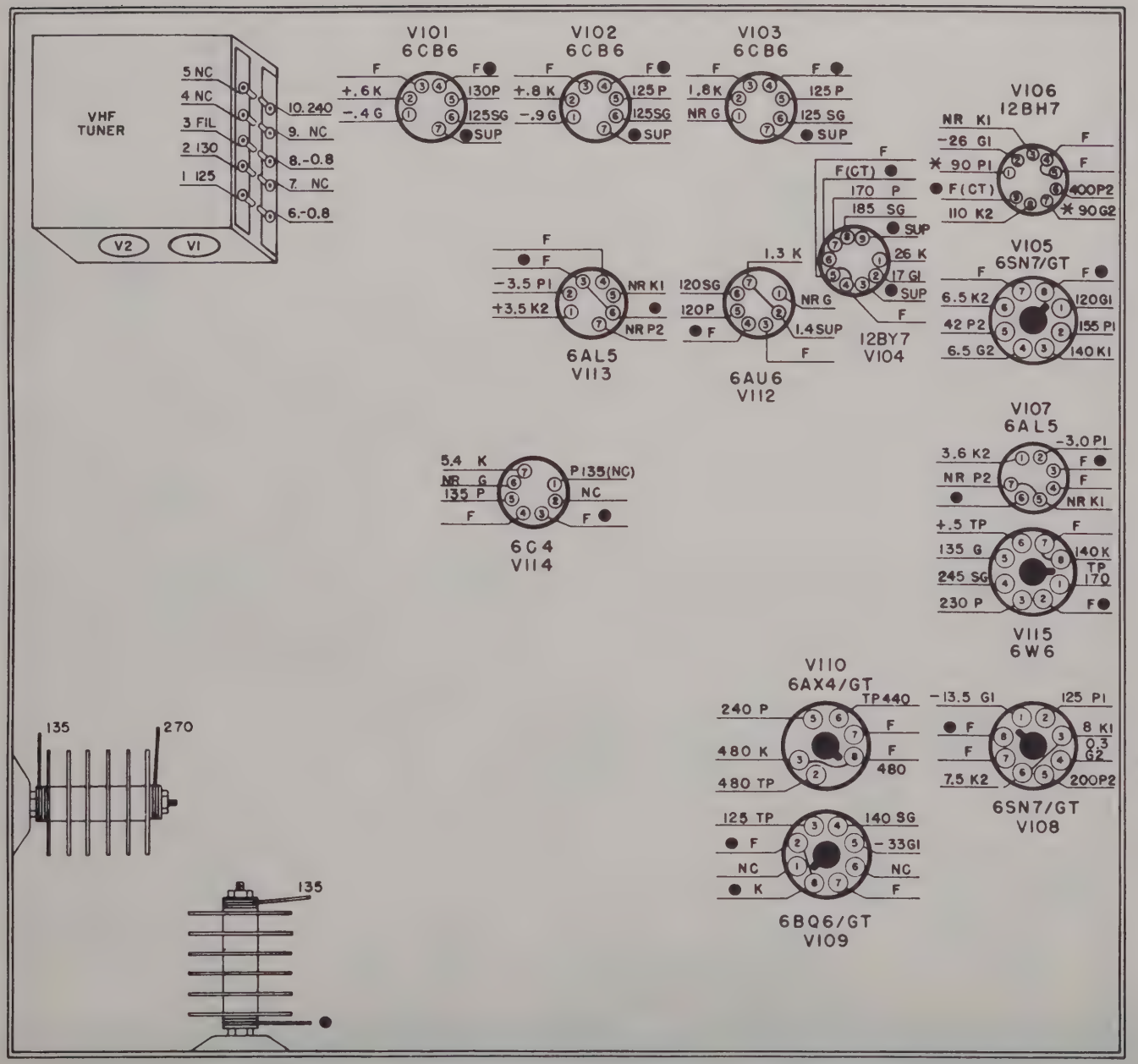
▲ VARIES FROM 3 TO 24V. DEPENDING ON SETTING OF CONTRAST CONTROL.

$ VARIES FROM 0-16 V. DEPENDING ON SETTING OF CONTRAST CONTROL.

○ FOR VOLTAGES OF VHF TUNER ON VHF SEE PAGE 1953-528

92C2121-1

Fig. 527A. Voltage Chart for Chassis B1300D & F1300D (Runs 1 & 3)



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. ALL READINGS TAKEN WITH A VTVM.
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117 V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.

KEY

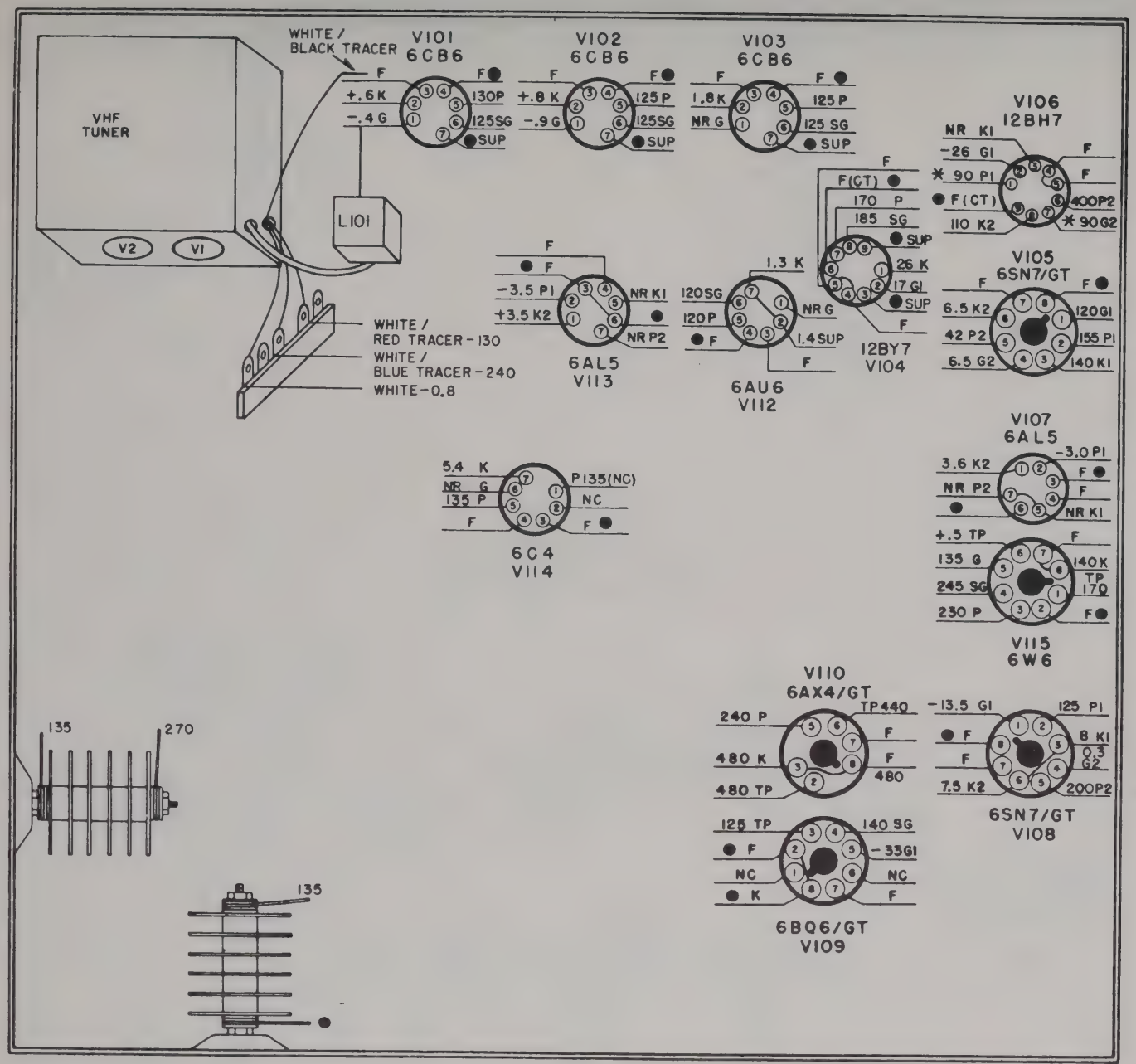
✱ VARIES FROM 50 TO 160 V. DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS

TP TIE POINT.
NC NO CONNECTION.
NR NOT READABLE.

92C2122-1

Fig. 528A. Voltage Chart for Chassis C1300D (Run 1)



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. ALL READINGS TAKEN WITH A VTVM.
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117 V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.

KEY

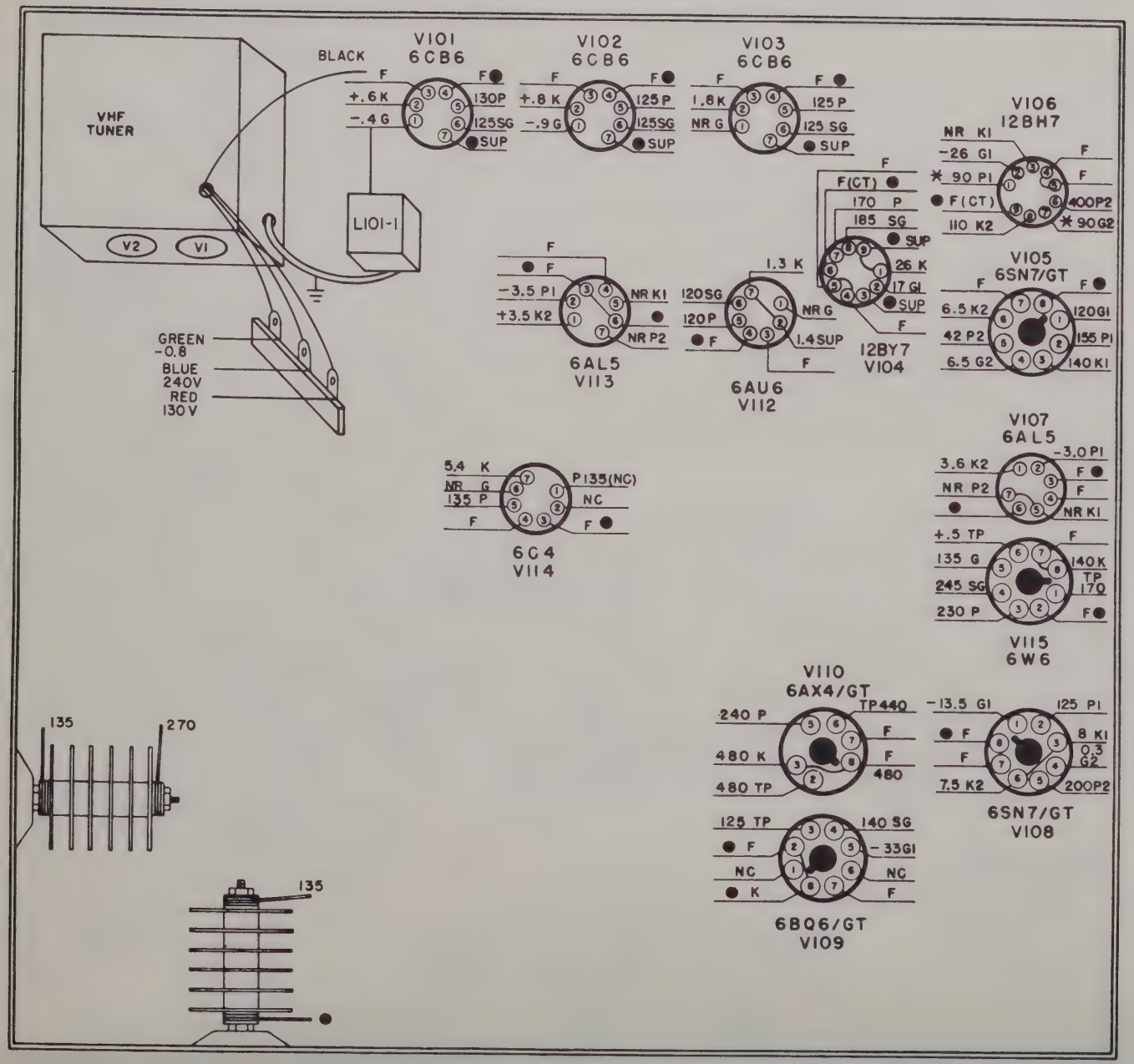
* VARIES FROM 50 TO 180V. DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS

TP TIE POINT.
NC NO CONNECTION.
NR NOT READABLE.

92C2207

Fig. 528AA. Voltage Chart for Chassis C1300D (Run 2)



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. ALL READINGS TAKEN WITH A VTVM.
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117 V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.

KEY

* VARIES FROM 50 TO 160V. DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

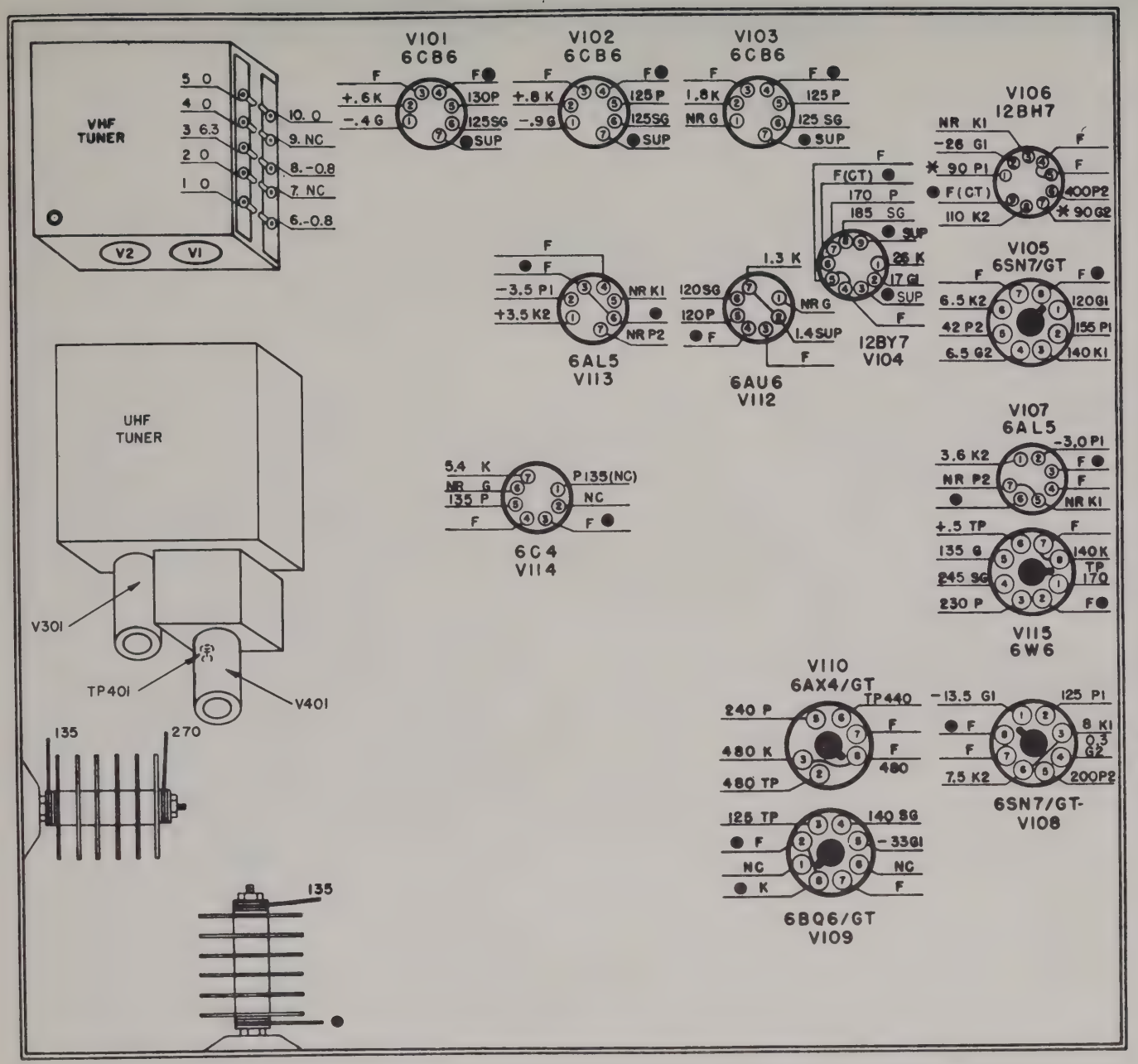
● INDICATES GROUND LUGS

TP TIE POINT.
NC NO CONNECTION.
NR NOT READABLE.

92C2208

Fig. 528BA. Voltage Chart for Chassis C1300D (Run 3)

94X1198-1
1053



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. CHANNEL SELECTOR SET TO UHF POSITION.
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117 V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
9. ALL READINGS TAKEN WITH A VTVM.

KEY

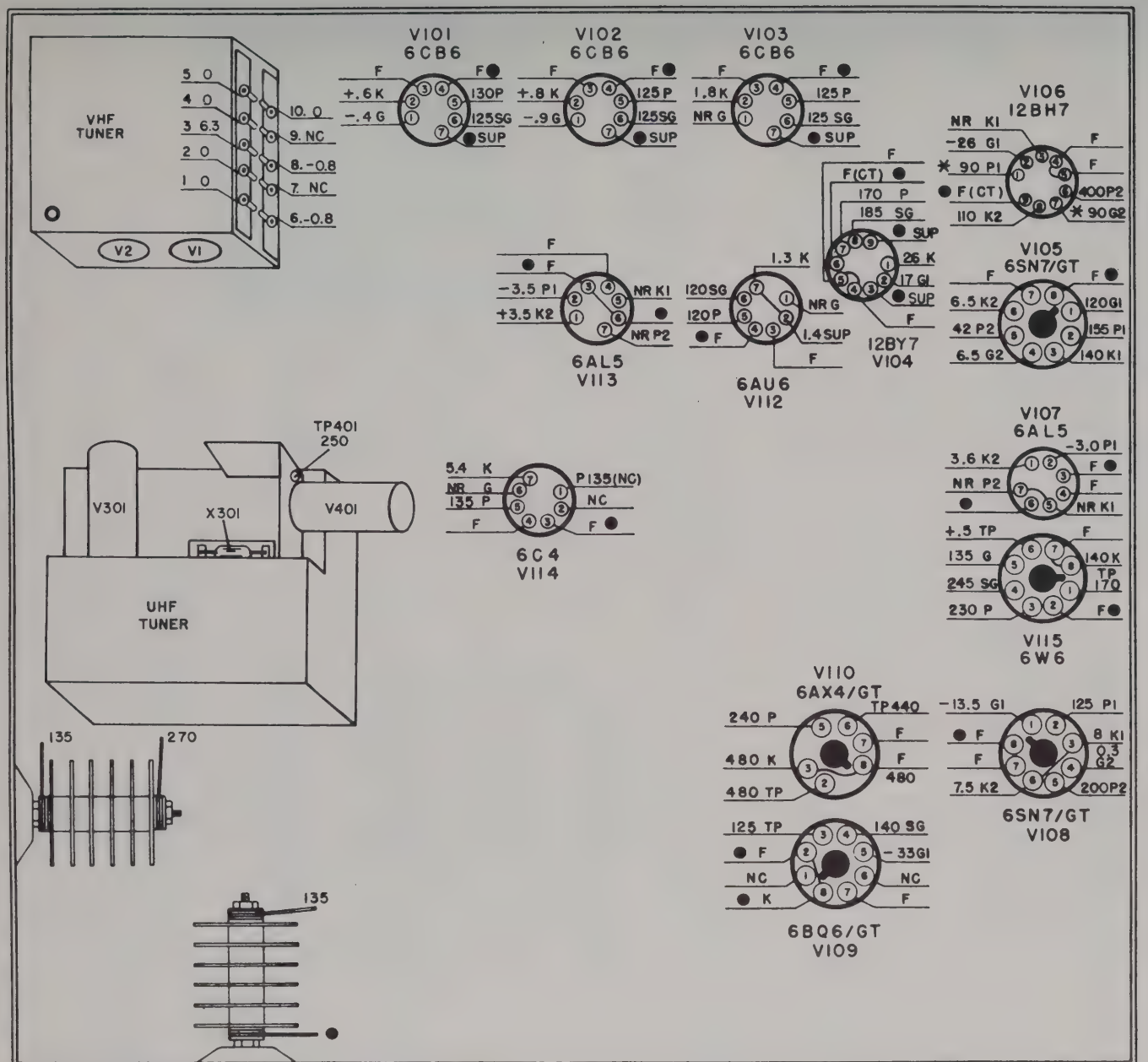
* VARIES FROM 50 TO 160V. DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS

TP TIE POINT.
NC NO CONNECTION.
NR NOT READABLE.
O FOR TUNER VOLTAGE FOR VHF OPERATION
SEE PAGE 1953-528

92C2209

Fig. 528CA. Voltage Chart for Chassis D1300D (Run 3)



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS:

1. ANTENNAS DISCONNECTED, AND TERMINALS SHORTED.
2. CHANNEL SELECTOR SET TO UHF POSITION.
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET TO MAXIMUM COUNTER CLOCKWISE POSITION.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117 V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
9. ALL READINGS TAKEN WITH A VTVM.

KEY

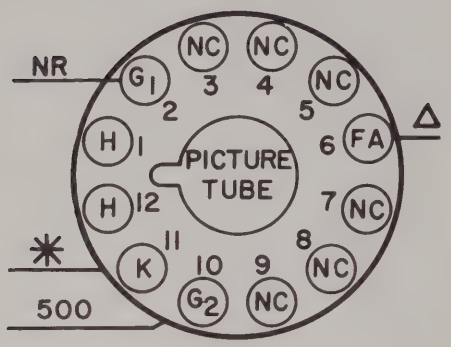
* VARIES FROM 50 TO 160V. DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

● INDICATES GROUND LUGS

TP TIE POINT.
NC NO CONNECTION.
NR NOT READABLE.
O FOR TUNER VOLTAGE FOR VHF OPERATION SEE PAGE 1953-528

92C2123-1

Fig. 529A. Voltage Chart for Chassis D1300D (Runs 1 & 2)



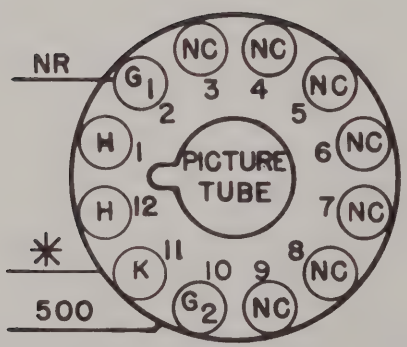
✳ 30 BRIGHTNESS MAX
150 BRIGHTNESS MIN

△ 0 FOCUS CONTROL MIN
500 FOCUS CONTROL MAX

PICTURE TUBE LEAD COLOR CODE		
PIN NO	COLOR	ELEMENT
1	BLACK	HEATER & GND.
2	GREEN	GRID
6	BLUE	FOCUS GRID
10	RED	ANODE GRID
11	YELLOW	CATHODE
12	BROWN	HEATER

92B1769

Fig. 530A. 17" Picture Tube Socket Voltages



✳ 25 BRIGHTNESS MAX
135 BRIGHTNESS MIN

PICTURE TUBE LEAD COLOR CODE		
PIN NO	COLOR	ELEMENT
1	BLACK	HEATER & GND.
2	GREEN	GRID
10	RED	ANODE GRID
11	YELLOW	CATHODE
12	BROWN	HEATER

92B2080

Fig. 530B. 21" Picture Tube Socket Voltages

TYPICAL OSCILLOSCOPE PATTERNS

The patterns given on the following pages are presented as a guide when using an oscilloscope to locate trouble in the video amplifier, sync., horizontal oscillator, horizontal output, vertical oscillator, and vertical output stages of the television receiver.

Considerable variation may be noted in the amplitude and shape of some of the various waveforms from one receiver to the next. As long as the waveform obtained from the receiver under test contains the same general characteristics as those shown in the illustrations and the relative amplitude is within approximately 25% of the peak to peak voltage or relative amplitude shown below each waveform the pattern obtained may be assumed to be correct. The patterns are observed with the tv receiver tuned to an active channel and the controls adjusted for the best possible picture. The line voltage should be set to 117 volts.

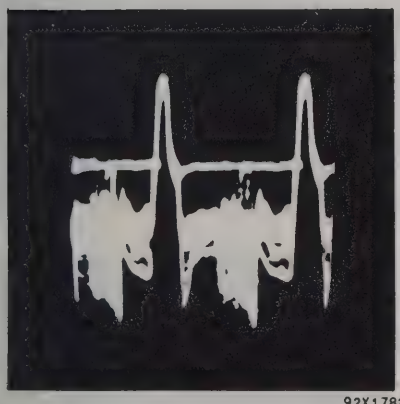
The waveforms shown in the illustrations were obtained on a Dumont type 304 oscilloscope which was used in conjunction with a low capacity 10 to 1 probe such as the Tel-Instrument Co. type 1610. Other types of oscilloscopes will account for a certain amount of variation in the amplitude and shape of the patterns obtained from the actual receiver under test. A low capacity probe must be used in order to obtain satisfactory results. A power line isolation transformer should also be used for safety since the chassis is "hot".

With the exception of the test patterns obtained across the vertical yoke and horizontal yoke all patterns are taken with the ground side of the oscilloscope connected to the ground or chassis of the tv receiver and the 10 to 1 probe connected to the specific points in the tv chassis as specified by each pattern.

The patterns obtained from the horizontal amplifier plate, damper cathode, horizontal deflection yoke, and the high voltage rectifier tube must be observed by means of the high voltage probe which is made from a type 1X2-A tube as shown in Fig. 534A. The tube is used as a high voltage coupling capacitor. Use a new tube for this application because the loose filament of a burned out one may touch the plate and damage the probe or input circuit of the scope. These patterns are shown with their relative amplitudes indicated with respect to the pattern obtained at pin 3 (cathode) of the damper tube (V-110) which is given a unit value of one.

At certain points throughout the tv receiver the oscilloscope pattern obtained will be dependent upon the frequency of the horizontal sweep oscillator in the oscilloscope. The oscilloscope sweep frequency must be either 30 cps (1/2 of the tv vertical oscillator frequency) or 7875 cps (1/2 of the tv horizontal oscillator frequency) depending upon the pattern desired. The sweep frequency required to obtain the patterns shown is given with each pattern.

VIDEO AMPLIFIER



92X1783-A

V-104
Video Amp.

Plate pin 7

Sweep Freq.
7875 cps

Voltage P/P
set 60 volts

Adjust the contrast control to give a 60 volt peak to peak reading. Do not change this setting when taking other waveforms.

SYNC. CLIPPER

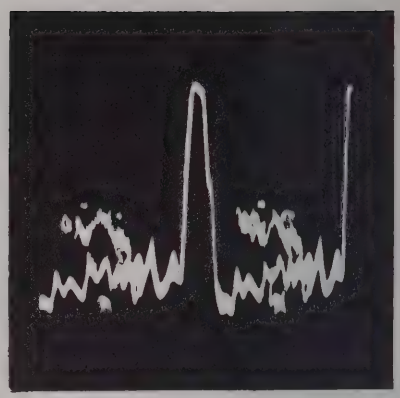
Before viewing the following waveforms set the contrast control for the 60 volt peak to peak reading and the pattern shown on page 1953-521.

V-105
Sync. Clip

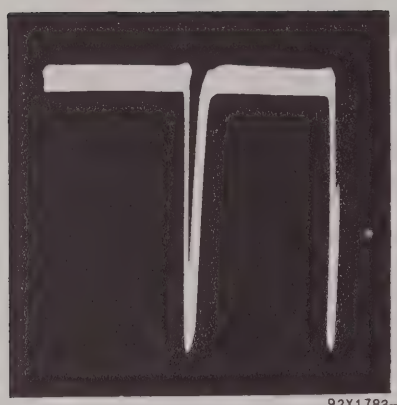
Grid Pin 1

Sweep Freq.
7875 cps

Voltage P/P
45 volts



92X1783-B



V-105
Sync. Clip.

Plate Pin 2

Sweep Freq.
7875 cps

Voltage P/P
45 volts

92X1783-C

V-105
Sync. Clip.

Plate Pin 5

Sweep Freq.
7875 cps

Voltage P/P
35 volts

92X1783-D

VERTICAL OSCILLATOR AND VERTICAL AMPLIFIER

Junction of
R-138, R-140
& C-129

Sweep Freq.
30 cps

Voltage P/P
45 volts

92X1783-E

V-106A
Vert. Osc.

Grid Pin 2

Sweep Freq.
30 cps

Voltage P/P
130 volts

92X1783-F

V-106B
Vert. Out.

Grid Pin 7

Sweep Freq.
30 cps

Voltage P/P
90 volts

92X1783-H

V-106B
Vert. Out.

Plate Pin 6

Sweep Freq.
30 cps

Voltage P/P
1500 volts

92X1783-I

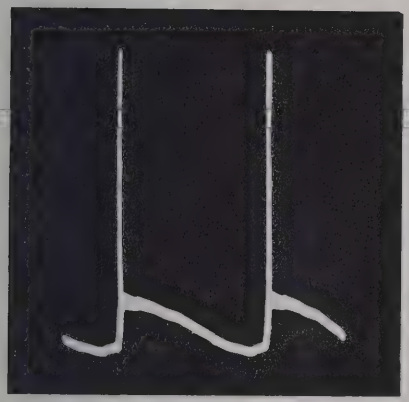
PIX TUBE GRID AND VERTICAL YOKE

V-116
Pix Tube

Grid Pin 2
Green Lead
Sweep Freq.
30 cps

Voltage P/P
30 volts

92X1783-K



Across Vert.
Yoke

Green Leads

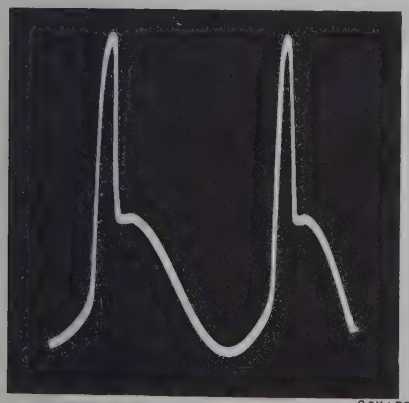
Sweep Freq.
30 cps

Voltage P/P
30 volts

92X1783-J

NOTE: When observing this test pattern the oscilloscope must not be grounded since the ground side of the scope is connected to B+ of the power supply. Do not touch the tv chassis and the scope during this observation as a severe shock will result. The "hot" lead of the scope should be connected to the green wire and the other scope lead should be connected to the green wire with black tracer.

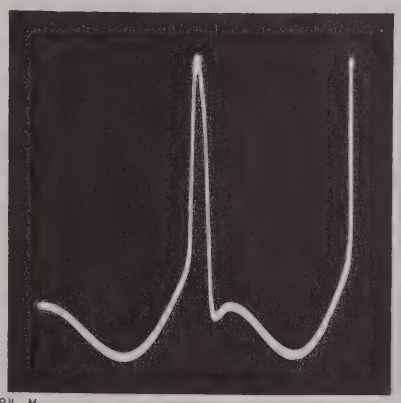
HORIZONTAL OSCILLATOR AND HORIZONTAL AMPLIFIER DRIVE



V-108
Horiz. Osc.
Plate Pin 5
Sweep Freq.
7875 cps
Voltage P/P
45 volts

92X1784-L

V-108
Horiz. Osc.
Grid Pin 1
Sweep Freq.
7875 cps
Voltage P/P
45 volts

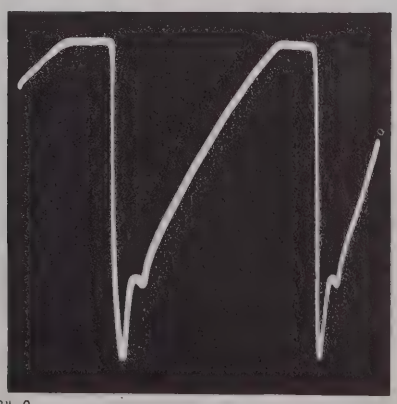


92X1784-M

V-108
Horiz. Osc.
Plate Pin 2
Sweep Freq.
7875 cps
Voltage P/P
145 volts

92X1784-N

V-109
Horiz. Out.
Grid Pin 5
Sweep Freq.
7875 cps
Voltage P/P
140 volts



92X1784-O

HORIZONTAL AMPLIFIER, DAMPER AND HIGH VOLTAGE RECTIFIER

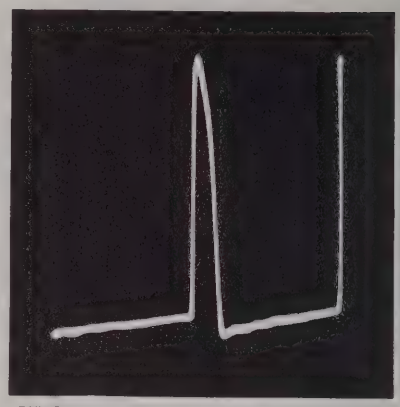
Before endeavoring to view the following waveforms read the notes and instructions at the beginning of this section pertaining to waveforms. The high voltage probe shown below must be used to prevent damage to the test equipment being used.

V-110
Damper

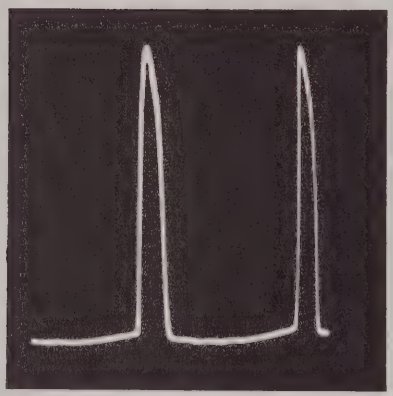
Cath. Pin 3

Sweep Freq.
7875 cps

Voltage Ratio
1 time



94X1784-Q



Across Horiz.
Yoke

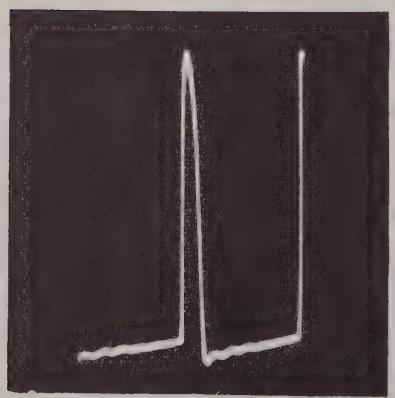
Red Wires

Sweep Freq.
7875 cps

Voltage Ratio
1 time

92X1784-S

NOTE: When observing this test pattern the oscilloscope must not be grounded since the ground side of the scope is connected to B+ of the power supply. Do not touch the tv chassis and the scope during this observation as a severe shock will result. The "hot" lead of the scope should be connected to the red wire and the other scope lead should be connected to the red wire with black tracer.



V-109
Horiz. Out.

Plate Cap

Sweep Freq.
7875 cps

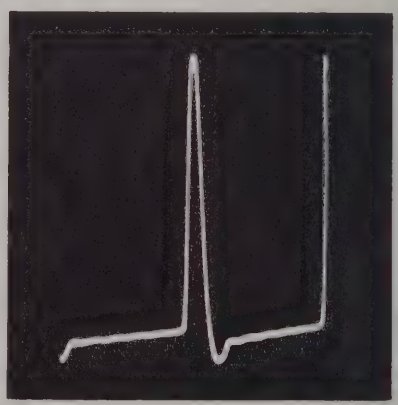
Voltage Ratio
1.7 times

92X1784-P

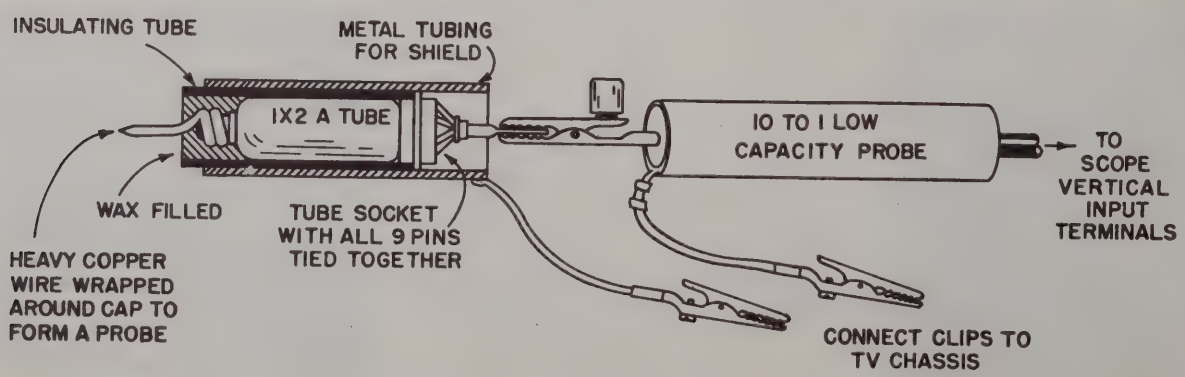
V-111
High Volt.
Rectifier
Plate Cap

Sweep Freq.
7875 cps

Voltage Ratio
5.5 times



92X1784-R



9281520

Fig. 534A. High Voltage Probe for Waveform Observations

SERVICE PARTS LIST

The following combined parts list may be used to determine replacement parts for the 1300D series TV chassis.

A. Refer to applicable schematic for correct schematic symbol
B. Refer to parts list for description and Hallicrafters Part Number for this symbol.

SYMBOL	FOUND IN
1 through 100	VHF tuner
101 through 300	Main chassis
301 through 400	UHF tuner
401 through 500	Special I-F Cascode amplifier

When schematic symbol is followed by dash and another number, a revision in value of part is indicated, but part will be found in same position in circuit.

Use latest revision of parts list available to prevent ordering wrong parts.
Cabinet parts may be determined by referring to the pages devoted to individual models.

TRANSFORMERS AND COILS

Schematic Symbol	Description	Hallicrafters Part Number
T-101	Transformer, 1st I-F	50B573
T-102	Transformer, 2nd I-F	50B574
T-103	Transformer, 3rd I-F	50B575
T-104	Transformer, vertical blocking oscillator	55B190
T-105	Transformer, vertical output	55C192
T-106	Transformer, heater	52D290
*T-107	Transformer, horizontal output	55D223 or 55D235
T-107-1	Transformer, horizontal output	55D197
T-108	Transformer, ratio detector	50B473
T-109	Transformer, audio output	55C191

*T-107 (55D223) may be used with either 51B1788 or 51B1835 Width Coil
T-107 (55D235) may be used only with 51B1788 Width Coil

L-101	Coil, tuner I-F coupling	51B1643
L-101-1	Coil, tuner I-F coupling	51A1841
L-102	Coil, tweet filter	53A307
L-103	Coil, video peaking	51B1709 or 51B1838
L-104	Coil, video peaking	51B1710
L-105	Coil, A.G.C. network	53A304
L-106	Coil, video peaking; wound on R-125	51B1711
L-107	Coil, 4.5 mc. trap	51B1541
L-108	Coil, video peaking	51B1712
L-109	Coil, video peaking; wound on R-129	51B1713
L-110	Choke, heater	53A282
L-111	Choke, heater	53A282
L-113	Coil, horizontal stabilizer	51B1642
L-114	Coil, 4.5 mc. amplifier grid adj.	51B1542
L-115	Voice coil,; part of speaker	- - - - -
L-116	Hum bucking coil; part of speaker	- - - - -
L-117	Field coil; part of speaker	- - - - -
L-118	Deflection coils for 21" pix tube	53C303
L-118-1	Deflection coils for 17" pix tube	53A271
L-119	Coil, yoke coupling; wound on C-172	- - - - -
L-120	Coil, width control	51B1788 or 51B1835
L-401	Coil, coupling; input cascode amplifier	51A1754
L-402	Coil, neutralizing; cascode I-F amplifier	51A1755
L-403	Coil, cascode amplifier output	51A1756
L-404	Coil, peaking	51A1757
L-405	Coil, output coupling	51A1758

SERVICE PARTS LIST (Cont.)

TUBE AND RECTIFIER COMPLEMENT

Schematic Symbol	Description	Hallicrafters Part Number
V-1	R-F. amplifier: VHF tuner	See below
V-2	Osc./mixer; VHF tuner	See below
V-101	1st I-F amplifier	90X6CB6
V-102	2nd I-F amplifier	90X6CB6
V-103	3rd I-F amplifier	90X6CB6
V-104	Video Amplifier	90X12BY7
V-105	Sync clipper	90X6SN7GT
V-106	Vertical oscillator and output	90X12BH7
V-107	Horizontal AFC	90X6AL5
V-108	Horizontal oscillator	90X6SN7GT
V-109	Horizontal output	90X6BQ6GT
V-110	Damper	90X6AX4
V-111	High voltage rectifier	90X1B3GT
V-112	Sound I-F amplifier (4.5 mc)	90X6AU6
V-113	Ratio detector	90X6AL5
V-114	Audio amplifier	90X6C4
V-115	Audio output amplifier	90X6W6
V-116	Picture tube -- See page 1953-542	- - - - - - -
V-301	Oscillator; UHF tuner	See below
V-401	UHF Cascode I-F amplifier	90X6BZ7
X-101	Selinium rectifier (300 ma.)	27A173
X-102	Selinium rectifier (300 ma.)	27A173
X-103	Video detector (1N64 germanium diode)	19B1864
X-301	Crystal mixer; UHF Tuner	See below
X-302	Crystal harmonic generator	See below

VHF & UHF TUNING UNITS

	For Chassis										
	A1300D E1300D		B1300D F1300D			C1300D			D1300D		
VHF Cascode tuning unit, with tubes	Run 1 1E1852	Run 2 1E1846	Run 1 1C1717	Run 2 1C1717	Run 3 1E1670	Run 1 1E1718	Run 2 1E1852	Run 3 1E1846	Run 1 1E1670	Run 2 1C1717	Run 3 1C1717
R-F amplifier	90X 6BZ7	90X 6BK7A	90X 6BZ7	90X 6BZ7	90X 6BZ7	90X 6BZ7	90X 6BZ7	90X 6BK7A	90X 6BZ7	90X 6BZ7	90X 6BZ7
Osc./Mi	90X6J6	90X6J6	90X6J6	90X6J6	90X6X8	90X6X8	90X6J6	90X6J6	90X6X8	90X6J6	90X6J6
UHF Tuning unit assembly	- - - -	- - - -	1E1660	1E1855	1E1660	- - - -	- - - -	- - - -	1E1660	1E1660	1E1855
Oscillator			90X6J6	90X6T4	90X6J6				90X6J6	90X6J6	90X6T4
Mixer			*19A833 1N82	19A833 (1N82)	*19A833 1N82				*19A833 1N82	*19A833 1N82	19A1833 (1N82)
Harmonic Generator			121A102 (G7B)	- - - -	121A102 (G7B)				121A102 (G7B)	121A102 (G7B)	- - - -

* 121A101 (K3) found on some tuners.

SERVICE PARTS LIST (Cont.)

CAPACITORS

Schematic Symbol	Description	Hallicrafters Part Number
C-101	1000 mmf. 500 V., ceramic tubular	47B230
C-102	5000 mmf. 500 V., ceramic disc	47A168
C-103	1000 mmf. 500 V., ceramic disc	47B230
*C-104	820 mmf. 500 V., 5%, ceramic tubular	47B320
C-105	24 mmf. 500 V., ceramic tubular	47B20A240K5
C-107	1000 mmf. 500 V., ceramic disc	47B230
*C-108	820 mmf. 500 V., 5%, ceramic tubular	47B320
C-110	24 mmf. 500 V., ceramic tubular	47B20A240K5
C-111	1000 mmf. 500 V., ceramic disc	47B230
*C-112	680 mmf. 500 V., ceramic tubular	47A319
C-113	1000 mmf. 500 V., ceramic disc	47B230
*C-114	10 mmf. 500 V., ceramic tubular	47B20100K5
C-115	4.7 mmf. 500 V., 10% ceramic tubular	47A160-6
C-116	0.1 mfd. 400 V., paper tubular	46AV104J
C-117	0.05 mfd. 200 V., paper tubular	46AU503J
*C-118	2.2 mmf. 500 V., ceramic tubular	47A160-4
C-119	100 mfd. 10 V., electrolytic	45B170
C-120	100-10 mfd. 300 V., 200-30 mfd. 150 V., electrolytic	45C209
C-121	30 mmf. 500 V., ceramic tubular	47X25PG300K
C-122	220 mmf. 500 V., ceramic tubular	47B20221K5
C-123	0.005 mfd. 600 V., paper tubular	46AY502J
C-124	22 mmf. 500 V., ceramic tubular	47B20220M5
C-125	0.1 mfd. 400 V., paper tubular	46AV104J
C-126	0.05 mfd. 400 V., paper tubular	46AW503J
C-127	4700 mmf. 400 V., paper tubular	46BS472L4
C-128	0.01 mfd. 400 V., paper tubular	46BS103L4
C-129	4700 mmf. 400 V., paper tubular	46BS472L4
C-130	200-5 mfd. 150 V., electrolytic	45C210
C-131	470 mmf. 150 V., mica	47X20B471K
C-132	10 mfd. 150 V., electrolytic	45A097
C-133	0.047 mfd. 400 V., paper tubular	46BS473L4
C-134	0.047 mfd. 400 V., paper tubular	46BS473L4
C-135	5000 mmf. 500 V., ceramic disc	47A168
C-136	5000 mmf. 500 V., ceramic disc	47A168
C-137	20 mfd. 450 V., electrolytic	45B208
C-139	200 mfd. 150 V., electrolytic	45B217
C-140	1000 mmf. 500 V., ceramic tubular	47B20A102M5
C-141	1000 mmf. 500 V., ceramic tubular	47B20A102M5
C-142	1000 mmf. 500 V., ceramic disc	47A230
C-143	1000 mmf. 500 V., ceramic disc	47A230
C-144	1000 mmf. 500 V., ceramic disc	47A230
*C-145	0.003 mfd. 400 V., paper tubular	46AW302J
C-146	0.02 mfd. 400 V., paper tubular	46AW203J
C-146-1	0.01 mfd. 400 V., paper tubular	46AW103J
*C-147	3900 mmf. 10%, 500 V., silver mica	47X30D392K
*C-148	390 mmf. 10%, 500 V., silver mica	47X20D391K
*C-149	390 mmf. 10%, 500 V., silver mica	47X20D391K
C-150	5000 mmf. 500 V., ceramic disc	47A168

* USE EXACT REPLACEMENT PART ONLY

SERVICE PARTS LIST (Cont.)

CAPACITORS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
C-150-1	560 mmf. 500 V., 10%, silver mica	47X20D561K
C-151	0.1 mfd. 600 V., paper tubular	46S104L6
C-151-1	0.047 mfd. 400 V., paper tubular	46BS473L4
C-152	1000 mmf. 500 V., ceramic disc	47A230
C-153	0.1 mfd. 600 V., paper tubular	46BS104L6
C-154	500 mmf. 20,000 V., ceramic	47A308
C-155	0.1 mfd. 200 V., paper tubular	46AU104J
C-156	68 mmf. 500 V., ceramic tubular	47X30TH680K
C-157	0.004 mfd. 500 V., dual ceramic disc	47A218
C-158	5 mfd. 50 V., electrolytic	45B175
C-159	330 mmf. 500 V., ceramic tubular	47B20331M5
C-160	1000 mmf. 500 V., ceramic disc	47A230
C-161	5000 mmf. 500 V., ceramic disc	47A168
C-162	5000 mmf. 500 V., ceramic disc	47A168
C-163	1 mfd. 50 V., electrolytic	45A163
C-164	0.01 mfd. 400 V., paper tubular	47A224
C-165	0.05 mfd. 600 V., paper tubular	46AY503J
C-166	0.02 mfd. 600 V., paper tubular	46AY203J
C-167	47 mmf. 2000 V., part of L-118 or 118-1	- - - - - - - -
C-168	330 mmf. 1500 V., ceramic disc	47A447
C-169	330 mmf. 1500 V., ceramic disc	47A447
C-170	330 mmf. 1500 V., ceramic disc	47A447
C-171	330 mmf. 1500 V., ceramic disc	47A447
C-172	0.1 mfd. 200 V., paper tubular (part of L-119)	- - - - - - - -
C-173	0.006 mfd. 600 V., paper tubular	46AZ602F
C-174	0.0047 mfd. 1000 V., paper tubular	46BS472L10
C-175	0.1 mfd. 600 V., paper tubular	46AY104J
C-176	0.5 mfd. 25 V., paper tubular	46A177
C-177	1000 mmf. 500 V., ceramic disc	47A230
C-401	0.5 to 3.0 mmf. trimmer	44B442
C-402	470 mmf. G.M.V. 500 V., ceramic	47B20A471N5
C-403	4.7 mmf. 500 V., ceramic	47X20UK047K/D
C-404	470 mmf. G. M. V. 500 V., ceramic	47B20A471N5
C-405	470 mmf. G. M. V., 500 V., ceramic	47B20A471N5
C-406	1000 mmf. ceramic feed thru	47B402
C-407	100 mmf. 5%, 500 V., ceramic	47B20A101J5
C-407-1	82 mmf. 5%, 500 V., ceramic	47B20A820J5
C-408	1000 mmf. ceramic feed thru	47B402
C-409	470 mmf. G. M. V. 500 V., ceramic	47B20A471N5
C-410	1000 mmf. ceramic feed thru	47B402

SERVICE PARTS LIST (Cont.)

RESISTORS

Schematic Symbol	Description	Hallicrafters Part Number
R-101.	220 ohms 1/2 watt, carbon	23X20X221K
R-102.	6800 ohms 1/2 watt, carbon	23X20X682K
R-103.	1000 ohms 1/2 watt, carbon	23X20X102K
R-104.	47 ohms 1/2 watt, carbon.	23X20X470K
R-105.	470 ohms 1/2 watt, carbon.	23X20X471K
R-106.	22,000 ohms 1/2 watt, carbon.	23X20X223K
R-107.	1000 ohms 1/2 watt, carbon	23X20X102K
R-108.	47 ohms 1/2 watt, carbon.	23X20X470K
R-109.	100 ohms 1/2 watt, carbon.	23X20X101K
R-110.	470 ohms 1/2 watt, carbon.	23X20X471K
R-111.	100 ohms 1/2 watt, carbon.	23X20X101K
R-112.	15,000 ohms 1/2 watt, carbon.	23X20X153K
R-113.	150 ohms 1/2 watt, carbon.	23X20X151K
R-114.	470 ohms 1/2 watt, carbon.	23X20X471K
R-115.	1.5 megohms 1/2 watt, carbon.	23X20X155K
R-116.	390,000 ohms 1/2 watt, carbon	23X20X394K
R-117.	22,000 ohms 1 watt, carbon	23X30X223K
R-118.	5600 ohms 1/2 watt, carbon	23X20X562K
R-120.	1.5 megohms 1/2 watt, carbon	23X20X155K
R-121.	2.2 megohms 1/2 watt, carbon	23X20X225K
R-122.	1 megohm 1/2 watt, carbon	23X20X105K
R-123.	150 ohms 1/2 watt, carbon.	23X20X151K
R-124/176. . .	1000/1,000,000 ohms dual contrast/volume control	25B1056
R-125.	22,000 ohms 1/2 watt, carbon; part of L-106	- - - - - - -
R-126.	15,000 ohms 2 watts, carbon	23X40X153K
R-127.	8200 ohms 2 watts, carbon.	23X40X822K
R-128.	10,000 ohms 2 watts, carbon.	23X40X103K
R-129.	3300 ohms, 1/2 watt; part of L-109	- - - - - - -
R-130.	10,000 ohms 1/2 watt, carbon.	23X20X103K
R-131.	470,000 1/2 watt, carbon	23X20X474K
R-132.	2.2 megohms 1/2 watt, carbon	23X20X225K
R-133.	820,000 ohms 1/2 watt, carbon	23X20X824K
R-134.	2200 ohms 1/2 watt, carbon	23X20X222K
R-135.	47,000 ohms 1/2 watt, carbon.	23X20X473K
R-136.	560,000 ohms 1 watt, carbon	23X30X564K
R-137.	6800 ohms 1/2 watt, carbon	23X20X682K
R-138.	33,000 ohms 1/2 watt, carbon.	23X20X333K
R-139.	10,000 ohms 1 watt, carbon	23X30X103K
R-140.	10,000 ohms 1/2 watt, carbon.	23X20X103K
R-141/182. . .	1,100,000/50,000 ohms dual vert. hold/brightness control	25B1047
R-142.	2200 ohms 1/2 watt, carbon	23X20X222K
R-143.	22,000 ohms 1 watt, carbon	23X30X223K
R-144.	3300 ohms 1/2 watt, carbon	23X20X332K
R-145.	15,000 ohms 1/2 watt, carbon.	23X20X153K
R-146.	5 megohms, vertical height control	25B998
R-147.	750 ohms, vertical linearity control	25B999
*R-148.	8700 ohms 5 watt, wirewound	24A971
R-149.	120 ohms 1/2 watt, carbon.	23X20X121K
R-150.	2.2 ohms 1/2 watt, carbon	23X20X022K
R-151.	100,000 ohms 1/2 watt, carbon.	23X20X104K
R-152.	220 ohms 1/2 watt, carbon.	23X20X221K
R-153.	7.2 ohms 5% 5 watt, fuse type	25B1011
R-154.	100,000 ohms 1/2 watt, carbon	23X20X104K
R-155.	100,000 ohms 1/2 watt, carbon	23X20X104K

* USE EXACT REPLACEMENT PART ONLY

SERVICE PARTS LIST (Cont.)

RESISTORS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
R-156.	4.7 megohms 1/2 watt, carbon.	23X20X475K
R-157.	4.7 megohms 1/2 watt, carbon.	23X20X475K
R-158.	1500 ohms 5% 1/2 watt, carbon	23X20X152J
R-159.	8200 ohms 1/2 watt, carbon	23X20X822K
R-160.	33,000 ohms 1/2 watt, carbon.	23X20X333K
R-160-1. . . .	82,000 ohms 1/2 watt, carbon.	23X20X823K
R-161/179. . .	120,000/10,000 ohms dual horiz. hold/tone control	25B1046
R-162.	100,000 ohms, 1/2 watt, carbon	23X20X104K
R-162-1. . . .	220,000 ohms 1/2 watt, carbon	23X20X224K
R-163.	10,000 ohms 1/2 watt, carbon.	23X20X103K
R-163-1. . . .	8200 ohms 1/2 watt, carbon.	23X20X822K
R-164.	470,000 ohms 1/2 watt, carbon	23X20X474K
R-165.	8200 ohms 2 watts, carbon.	23X40X822K
R-165-1. . . .	10,000 ohms 2 watts, carbon.	23X40X103K
R-166.	4700 ohms 1 watt, carbon.	23X30X472K
R-167.	3.3 ohms; part of T-107.	- - - - - - -
R-167-1	2.2 ohms; part of T-107-1	- - - - - - -
R-168.	1 megohm 1 watt, carbon.	23X30X105K
R-169.	15 ohms 1 watt, carbon.	23X30X150K
R-170.	150 ohms 1/2 watt, carbon.	23X20X151K
R-171.	2200 ohms 1/2 watt, carbon	23X20X222K
R-172.	270 ohms 1/2 watt, carbon.	23X20X271K
*R-173.	10,000 ohms 5%, 1/2 watt, carbon.	23X20X103J
*R-174.	10,000 ohms 5%, 1/2 watt, carbon.	23X20X103J
R-175.	33,000 ohms 1/2 watt, carbon	23X20X333K
R-176/124. . .	1 megohm/1000 ohm dual volume/contrast control.	25B1056
R-177.	1200 ohms 1/2 watt, carbon	23X20X122K
R-178.	33,000 ohms 1/2 watt, carbon.	23X20X333K
R-179/161. . .	10,000/120,000 ohm dual tone/horiz. hold control.	25B1046
R-180.	470,000 ohms, carbon.	23X20X474K
R-181.	5 ohms hum balancing control; part of speaker	- - - - - - -
R-182/141. . .	50,000/1,100,000 ohms brightness/vert. hold control	25B1047
R-183.	100,000 ohms 1/2 watt, carbon	23X20X104K
R-184.	470,000 ohms 1/2 watt, carbon	23X20X474K
R-185... . . .	470,000 ohms 1/2 watt, carbon	23X20X474K
R-186.	470,000 ohms 1/2 watt, carbon	23X20X474K
R-187.	470,000 ohms 1/2 watt, carbon	23X20X474K
R-189.	1.5 megohms; focus control	25B1003
R-190.	.50 ohms, horizontal centering; part of T-107-1	- - - - - - -
R-191.	22,000 ohms 1/2 watt, carbon.	23X20X223K
R-192.	33,000 ohms 1 watt, carbon	23X30X333K
R-193... . . .	180,000 ohms 1/2 watt, carbon	23X20X184K
R-194.	1200 ohms 1/2 watt, carbon	23X20X122K
R-195.	1800 ohms 1/2 watt, carbon	23X20X182K
R-196.	10 megohms 1/2 watt, carbon	23X20X106K
R-197.	1000 ohms 1/2 watt, carbon; part of L-118	- - - - - - -
R-198.	47 ohms 1 watt, carbon	23X30X470K
R-199.	220 ohms 1/2 watt, carbon	23X20X221K
R-200.	3300 ohms 1/2 watt, carbon	23X20X332K
R-401.	120 ohms 1/2 watt, carbon	23X20X121K
R-402.	100,000 ohms 1/2 watt, carbon	23X20X104K
R-402-1	1.5 megohms 1/2 watt, carbon	23X20X155K
R-403.	1000 ohms 1/2 watt, carbon	23X20X102K
R-404.	1.5 megohms 1/2 watt, carbon	23X20X155K
R-405.	10,000 ohms 1/2 watt, carbon	23X20X103K

* USE EXACT REPLACEMENT PARTS ONLY

SERVICE PARTS LIST (Cont.)

MISCELLANEOUS PARTS FOR TV CHASSIS

Schematic Symbol	Description	Hallicrafters Part Number For Chassis					
		A1300D	B1300D	C1300D	D1300D	E1300D	F1300D
	Bearing, width control shaft	- - - - -	- - - - -	8A1810	8A1810	- - - - -	- - - - -
LM-301	Bulb, dial light, UHF dial.	- - - - -	39A004	- - - - -	39A004	- - - - -	39A004
	Cap and lead; horiz. output plate	87A3590	87A3590	87A3590	87A3590	87A3590	87A3590
	Clip, antenna lead	76A976	76A976	76A976	76A976	76A976	76A976
	Cord assembly with PL-103 and PL-104.	87A1668-1	87A1668-1.	87A1668-1.	87A1668-1.	87A1668-1.	87A1668-1
	Cord, dial (specify length)	- - - - -	38A026	- - - - -	38A026	- - - - -	38A026
	Coupling, width control shaft; plastic	- - - - -	- - - - -	29A195	29A195	- - - - -	- - - - -
	Grommet, rubber; tube socket shock mtg.	16A296	16A296	16A296	16A296	16A296	16A296
	Insulator, block, chassis mtg.	78B860	78B860	78B860	78B860	78B860	78B860
	Insulator, interlock; mtg. for SO-103.	8A1811	8A1811	8A1811	8A1811	8A1811	8A1811
	Insulator, 3-1/8" vol./cont. control	8B2020	8B2020	8B2020	8B2020	8B2020	8B2020
	Ion trap	21A145	21A145	21A145	21A145	21A146	21A146
	Knob, AGC control switch.	15A562	15A562	15A562	15A562	15A562	15A562
	Knob, brightness control.	15A648	15A648	15A648	15A648	15A648	15A648
	Knob, horizontal hold control.	15A648	15A648	15A648	15A648	15A648	15A648
	Knob, tone control.	15A649	15A649	15A649	15A649	15A649	15A649
	Knob, vertical hold control	15A649	15A649	15A649	15A649	15A649	15A649
	Plate, control mounting; fiber	8A1790	8A1790	8A1790	8A1790	8A1790	8A1790
	Plate, elect. cap ; 4 prong, 1-13/16" mtg. centers.	8A749	8A749	8A749	8A749	8A749	8A749
	Plate, front chassis cover.	63A968	63A968	63A968	63A968	63A968	63A968
	Plate, mounting; for L-113.	63A902	63A902	63A902	63A902	63A902	63A902
	Plate, shock mounting; V-106	63A821	63A821	63A821	63A821	63A821	63A821
SO-102	Plug, speaker; with leads	SEE MODEL DATA SHEETS					
PL-103	Plug, interlock; part of line cord assembly	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
PL-104	Plug, wall outlet; part of line cord assembly	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
	Plug, two prong; R-153 mtg.	88A851	88A851	88A851	88A851	88A851	88A851
	Ring, retaining; UHF dial shaft.	- - - - -	76A552	- - - - -	76A552	- - - - -	76A552
	Scale, UHF dial (1E1660 tuner)	- - - - -	83C457	- - - - -	83C458	- - - - -	83C457
	Scale, UHF dial (1E1855 tuner)	- - - - -	83C460	- - - - -	83C460	- - - - -	83C460
	Shaft, horiz. centering control	- - - - -	- - - - -	76B559	76B559	- - - - -	- - - - -
	Shaft retaining ring; 1/4"	- - - -	- - - -	76A775	76A775	- - - -	- - - -
	Shaft retaining ring; 3/8"	76A968	76A968	76A968	76A968	76A968	76A968
	Shaft, width control adjustment; 1/4" diam.	74A669	74A669	74A558	74A558	74A669	74A669
	Shield, dial light	- - - - -	8B2025	- - - - -	8B2025	- - - - -	8B2025
	Shield, high voltage supply.	69D598	69D598	69D547	69D547	69D598	69D598
	Shield, miniature tube V-102 & V-103	69A232	69A232	69A232	69A232	69A232	69A232
	Socket assembly, UHF dial light.	- - - - -	86A144	- - - - -	86A144	- - - - -	86A144
SO-103	Socket, interlock; chassis mtg. male.	10A498	10A498	10A498	10A498	10A498	10A498
	Socket, octal molded; shock mount V-108	6A432	6A432	6A432	6A432	6A432	6A432
	Socket, octal molded; 1-5/16" mtg. centers.	6A436	6A436	6A436	6A436	6A436	6A436
	Socket, octal molded 1-1/2" mtg. pins 1 & 4 deleted.	6A440	6A440	6A440	6A440	6A440	6A440
	Socket, octal molded; pins 4 & 6 deleted.	6A495	6A495	6A495	6A495	6A495	6A495
	Socket, two prong; R-153 mounting	10A499	10A499	10A499	10A499	10A499	10A499
	Socket, 7 pin wafer; 1-5/16" mtg. centers.	6B314	6B314	6B314	6B314	6B314	6B314
	Socket, 7 pin wafer; 1" mtg. centers	6B340	6B340	6B340	6B340	6B340	6B340
	Socket, 7 pin wafer with dummy lug; 1" mtg. centers.	6B434	6B434	6B434	6B434	6B434	6B434
	Socket, 9 pin molded mica filled; 1-1/8" mtg. centers	6A433	6A433	6A433	6A433	6A433	6A433
	Socket, 9 pin min. wafer; 1-1/8" mtg. ctrs.	6A334	6A334	6A334	6A334	6A334	6A334
	Socket, 9 pin min; mica filled; 1-1/8" mtg. ctr.	- - - - -	6B493	- - - - -	6B493	- - - - -	6B493
	Spring, control shaft; horiz. centering control.	- - - - -	- - - - -	75A259	75A259	- - - - -	- - - - -
S-101	Switch, off-on; part of volume/contrast control.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
S-102	Switch, AGC control	60B507	60B507	60B507	60B507	60B507	60B507
S-103	Switch, VHF-UHF.	- - - - -	60C576	- - - - -	60C576	- - - - -	60C576
TS-101	Terminal strip, VHF antenna.	88B456	88B456	88B456	88B456	88B456	88B456
TS-301	Terminal strip, UHF antenna.	- - - - -	88B456	- - - - -	88B456	- - - - -	88B456
TP-401	Test Terminal, low capacity	- - - - -	49A037	- - - - -	49A037	- - - - -	49A037
	Washer, extruded fiber; 3/8" I.D.	4A602	4A602	4A602	4A602	4A602	4A602

PICTURE TUBE AND MOUNTING COMPONENTS

Schematic Symbol	Description	Hallicrafters For A1300D B1300D C1300D D1300D	Part Number Chassis E1300D F1300D
V-116	Picture tube	90X17HP4	90X21AP4
	Bracket, deflection yoke mtg.	67C1244	67C1244
	Bracket, focus magnet mtg.	-----	67B2271
	Bracket, front right pix tube support	67D2312	67C2030
	Bracket, front left pix tube support	67D2313	67C2031
	Bracket, rear pix tube support	67A1987	67A2035
	*Bracket, spacer; front	----	8E2296
	*Bracket, spacer; rear	----	8E2295
	Centering device	21C158	-------
	Collar, rubber; pix tube mtg.	16A346	16A346
	Cushion, sponge rubber; pix tube mtg.	16A316	------
L-118	Deflection yoke	53A271	-------
L-118-1	Deflection yoke	----------	53C303
	Focus magnet with centering control	----	See Model Data Sheets
	Ion trap	21A145	21A146
	Keeper, pix tube anode	8A1375	-------
	Pad, pix tube mtg.; rubber channel	16A354	-------
	Pad, stop; rubber	16A353	16A291
PL-101	Plug, pix tube anode; with lead	10A500	-------
	Plug, deflection yoke	10A407	-------
	Polyethylene mtg. ring; metal pix tube	-----	7E313
	Screw, deflection yoke adjustment	3A1610	3A1610
	Sleeve, insulating; anode lead	65A542	65A542
	Sleeve, insulating; high voltage lead	-----	65A535
	Socket assembly, pix tube	6A465	6A484
	Spacer, deflection yoke adj. screw	73A580	73A580
	Spring, anode keeper; 1-1/2" long	75A202	-------
	Spring, anode keeper; 3-1/4" long	75A203	-------
	Spring, pix tube ground and shield	75B246	-------
	Spring, rear support; pix tube	75A268	75A272
	Strap, pix tube mtg.; with end brackets	76B1025	76A848
	Strap, copper; anode connector	----------	76A371
	Wire, high voltage; 2nd anode	----------	87A4173
	Yoke cap	----------	8C2222

* Not found on all chassis.

SERVICE PARTS LIST FOR 12 POSITION 1C1717 TUNERS

TRANSFORMERS AND COILS

Schematic Symbol	Description	Mfgrs. Cross Reference	Hallicrafters Part Number
T-1	Transformer, VHF antenna input	1921-1	51A1684
L-2	Coil, R-F grid assembly; part of S1A	- - - -	- - - -
L-3	Coi, R-F plate; Channel 13 Adj.	1984-14	51A1685
L-6	Coil, Mixer grid; Channel 13 Adj.	1785-52	51A1686
L-7	Coil, Osc. grid; Channel 13 Adj.	2051-1	121A146
L-8	Coil, Osc. grid; Channel 6 Adj.	2051-4	121A147
L-9	Coil, Output coupling Adj.	1790-10	121A148
L-11	Coil, cathode/plate coupling	1785-49	51A1690
L-12	Choke, heater	1894-1	53A296
L-13	Choke, heater	1894-2	53A297
L-14	Coil, neutralizing	1911-5	121A149

TUBES

V-1	6BZ7 Dual Triode R-F Amplifier	55	90X6BZ7
V-2	6J6 Dual Triode Oscillator/ Mixer	50	90X6J6

CAPACITORS

C-1	7.5 mmf. 10% ceramic stand-off.	2043-1	47A362
C-2	4 mmf. 5% NPO ceramic tubular	163-040	121A114
C-3	1.6 mmf. ceramic gimmick	2101-169	121A071
C-4	800 mmf. GMV. ceramic disc	2033-2	47A355
C-5	470 mmf. ceramic feed-thru.	2023-2	47A357
C-6	100 mmf. ceramic tubular; part of S1B	137-1	121A115
C-7	800 mmf. GMV. ceramic disc	2033-2	47A355
C-8	1.2 mmf. ceramic gimmick	2101-129	121A121
C-9	0.56 mmf. ceramic gimmick	2101-568	121A073
C-10	0.33 mmf. ceramic gimmick	2101-338	121A122
C-11	Fine tuning air trimmer	1713-502	121A117
C-12	1.5 mmf. ± 25 mmf. ceramic tubular	166-159	121A123
C-13	10 mmf. 5% ceramic tubular	168-100	121A118
C-14	0.39 mmf. ceramic gimmick.	2101-398	121A124
C-15	15 mmf. 10% ceramic tubular	162-150	121A119
C-16	140 mmf. 5% ceramic tubular	181-141	121A125
C-17	5000 mmf. GMV. ceramic disc	2033-7	47A168
C-19	470 mmf. 20% special tubular	136-1	121A826
C-20	800 mmf. GMV. ceramic disc	2033-2	47A355
C-21	800 mmf. GMV. ceramic disc	2033-2	47A355

CAPACITORS (Cont.)

C-22	800 mmf. GMV. ceramic disc	2033-2	47A355
C-23	62 mmf. 10% ceramic tubular	161-620	121A126

RESISTORS

R-1	4700 ohms ½ watt, carbon.	106-472	23X20X472K
R-2	1 megohm 5% ½ watt, carbon	101-105	23X20X105K
R-3	750,000 ohms 5% ½ watt, carbon	101-754	23X20X754J
R-4	470 ohms ½ watt, carbon	106-471	23X20X471K
R-5	220,000 ohms ½ watt, carbon	106-224	23X20X224K
R-6	15,000 ohms ½ watt, carbon	106-153	23X20X153K
R-7	8200 ohms ½ watt, carbon.	106-822	23X20X822K
R-8	2700 ohms ½ watt, carbon.	106-272	23X20X272K
R-9	10,000 ohms ½ watt, carbon	106-103	23X20X103K

MISCELLANEOUS

	Board terminal, 5 terminals.	1351-1	88A927
	Brace, shield.	2006-1	8A2136
	Clip, ground; for V2 tube shield.	1395-1	121A129
	Cover, bottom shield.	2004-2	66A914
	Fine tuning drive assembly	1853-514	121A067
	Screw, adjustment; for L3, L6, L7, & L8	1771-3	3A3138
	Shaft, assembly; for S1 and Fine Tuning.	1946-16	121A130
	Socket, 9 pin wafer; for V1 (6BZ7)	2009-3	6A474
	Socket, 7 pin wafer; for V2 (6J6)	1773-1	6A475
	Spacer, 1/8" ceramic	2000-4	73A829
	Spacer, 3/16" ceramic	2000-6	73A830
	Spacer, 5/16" ceramic	2000-10	73A832
	Spacer, 3/8" ceramic	2000-12	73A833
	Spacer, 7/16" ceramic	2000-14	73A834
	Spacer, 13/16 phenolic	2005-1	73A836
S1A	Switch, wafer assembly with L1 and L2.	1981-501	60A554
S1B	Switch, wafer assembly with L4, R4 and C6	1869-506	60A555
S1C	Switch wafer assembly with L5.	1867-502	121A127
S1D	Switch wafer assembly with L10	1866-502	121A128
	Tube shield for V-1, including base clips	2025-2 or 4	69A590
	Tube shield for V-2	1774-1	69A591
	Washer, "C" retaining; for S1 shaft	1781-1	4A1566
	Yoke, fibre	1881-2	8A2135

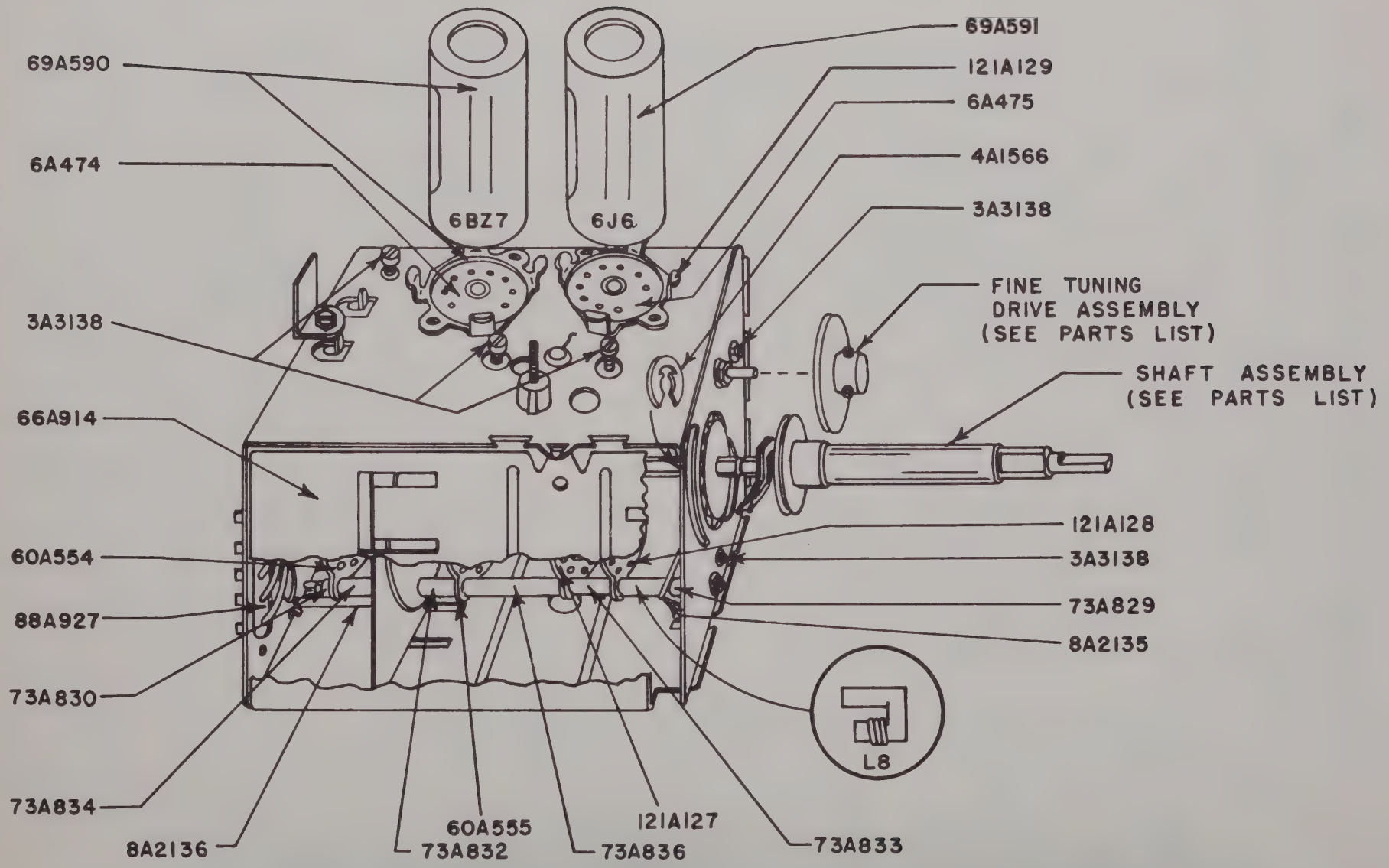


Fig. 542BA. Parts Identification for 1C1717 Cascode Tuner

SERVICE PARTS LIST FOR VHF 16 POSITION 1E1670 & 1E1718 TUNERS

TRANSFORMERS AND COILS

Schematic Symbol	Description	Mfgrs. Cross Reference	Hallicrafters Part Number
T-1	Transformer, VHF antenna input coupling	1964-5	51A1674
L-1	Coil, UHF input coupling (adjustable iron core)	2110-2	121A131
L-2	Channel 13 RF grid adj. (assembly)	1984-13	51A1676
L-3	Channel 13 RF plate adj.	1984-12	51A1677
L-4	Cascode Plate/Cath. coupling coil	1785-51	51A1678
L-5	Choke, heater; iron core	1894-1	53A296
L-6	Channel 13 Mixer Grid adj. (assembly)	1984-16	51A1679
L-7	Osc. coil & form assembly (channel 13)	2051-3	51A1680
L-8	Osc. coil & form assembly (channel 6)	2031-1	51A1681
L-9	Coil, i-f output (assembly)	1790-13	51A1682

TUBES

V-1	6BZ7 dual triode R.F. amp.	55	90X6BZ7
V-2	6X8 triode - pentode osc./mixer	52	90X6X8

CAPACITORS

C-1	800 mmf. GMV ceramic disc.	2033-2	47A355
C-2	15 mmf. ceramic tubular, part of S1A	162-150	121A119
C-3	22 mmf. ceramic tubular	162-220	121A143
C-4	3 mmf. ceramic tubular.	163-030	121A142
C-5	1000 mmf. GMV. ceramic disc.	2033-3	47A356
C-6	470 mmf. GMV ceramic feed thru.	2023-2	47A357
C-7	470 mmf. ceramic tubular; part of S1C	136-1	121A110
C-8	15 mmf. ceramic tubular; part of S1D	162-150	121A119
C-9	36 mmf. ceramic gimmick; part of S1D	2101-368	121A132
C-10	1.6 mmf. ceramic gimmick	2101-169	121A133
C-11	.30 mmf. ceramic gimmick	2101-308	121A134
C-12	.75 mmf. ceramic gimmick	2101-758	121A135
C-13	10 mmf. ceramic tubular	162-100	121A144
C-14	800 mmf. GMV. ceramic disc	2033-2	47A355
C-15	1000 mmf. mini. ceramic disc	2033-3	47A356
C-16	1000 mmf. GMV. ceramic disc	2033-3	47A356
C-17	1.5 mmf. ceramic tubular	166-159	121A123
C-18	10 mmf. ceramic tubular; part of S1E	163-100	121A136
C-19	1.6 mmf. ceramic gimmick	2101-169	121A133
C-20	Fine tuning control; air trimmer	1713-502	121A117
C-21	1.5 mmf. ceramic gimmick; part of S1E	2101-159	121A136
C-22	110 mmf. ceramic tubular	181-111	121A145
C-23	7.5 mmf. ceramic gimmick	2101-759	121A138
C-24	1000 mmf. ceramic disc	2033-3	47A356

CAPACITORS (Cont.)

Schematic Symbol	Description	Mfgrs. Cross Reference	Hallicrafters Part Number
C-25	800 mmf. miniature ceramic disc	2033-2	47A355
C-26	800 mmf. miniature ceramic disc	2033-2	47A355

RESISTORS

R-1	4700 ohms 1/2 watt, carbon	106-472	23X20X472K
R-2	1000 ohms 1/2 watt, carbon (part of S1C)	106-102	23X20X102K
R-3	750,000 ohms 5%, 1/2 watt. carbon (part of S1C)	101-754	23X20X754J
R-4	1 megohm 5%, 1/2 watt, carbon	101-105	23X20X105J
R-5	220,000 ohms 1/2 watt, carbon	106-224	23X20X224K
R-6	3900 ohms 1/2 watt, carbon (part of S1D)	106-392	23X20X392K
R-7	470 ohms 1/2 watt, carbon (part of S1D)	106-471	23X20X471K
R-8	1000 ohms 1/2 watt, carbon	106-102	23X20X102K
R-9	2200 ohms 1/2 watt, carbon	106-222	23X20X222K
R-10	15,000 ohms 1/2 watt, carbon	106-153	23X20X153K
R-11	220 ohms 1/2 watt, carbon	106-221	23X20X221K
R-12	4700 ohms 1/2 watt, carbon	106-472	23X20X472K
R-13	1000 ohms 1/2 watt, carbon	106-102	23X20X102K

MISCELLANEOUS

	Board, terminal; 5 terminals	1351-1	88A927
	Brace, shield	2006-1	8A2136
	Cover, shield	2004-2	66A914
	Fine Tuning drive assembly	1853-514	121A067
	Screw, adjustment; for L2, 3, 6, 7 and 8.	1771-3	3A3138
	Shaft, assembly for S1 and Fine tuning (1E1670)	1946-12	74A597
	(1E1718)	1946-16	121A100
	Socket, 9 pin wafer; Osc. V-2	2009-5	121A131
	Socket, 9 pin wafer; R.F. V-1.	2009-4	6A472
	Spacer, 1/8" ceramic	2000-4	73A829
	Spacer, 3/16" ceramic	2000-6	73A830
	Spacer, 1/4" ceramic	2000-8	73A831
	Spacer, 3/8" ceramic	2000-12	73A833
	Spacer, 13/16" Phenolic	2005-1	73A836
S1A	Switch wafer assembly, with coils and C-2	2038-503	60A549
S1B	Switch wafer assembly, with wire leads and C-3	2039-506	60A550
S1C	Switch wafer assembly, with coils, R-2, R-3, & C-7	2037-503	60A551
S1D	Switch wafer assembly, with coils, R-6. R-7, C-8, C-9.	2036-502	60A552
S1E	Switch wafer assembly, with coils C-18 & C-21	2035-504	60A553
	Tube shield	2026-4	121A140
	Tube Shield Base Clamp	2029-2	121A141
	Washer, "C" Retaining; for switch shaft	1781-1	4A1566
	Yoke, Fiber.	1881-2	8A2135

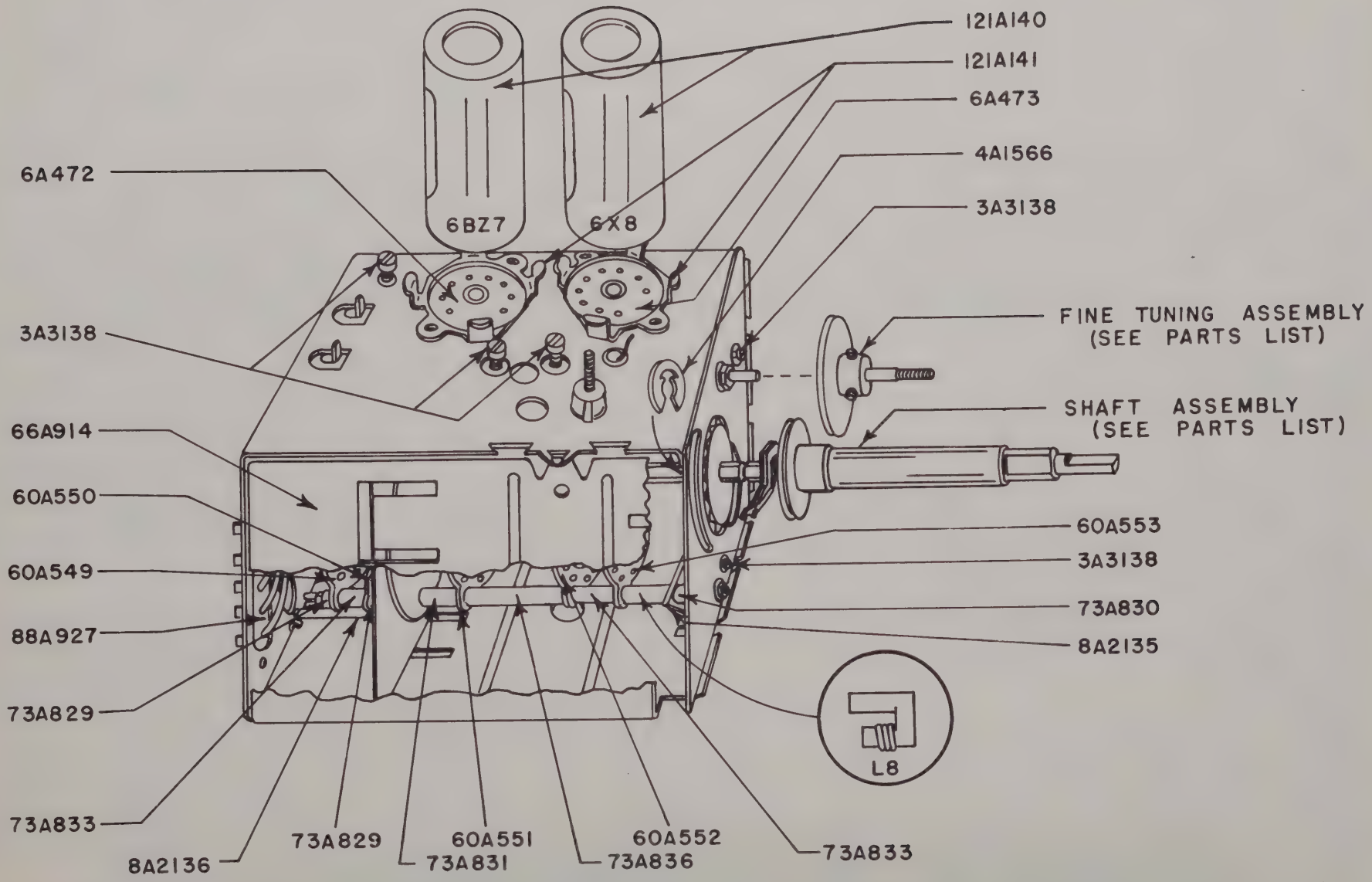


Fig. 544A. Parts Identification for 1E1670 & 1E1718 VHF Tuners

94X1198-1
1053

SERVICE PARTS LIST FOR 1E1855 VHF TUNERS

Schematic Symbol	Description	Mfgrs. Cross Reference	Hallicrafters Part Number
	COILS		
L-6	Choke, Heater; 6BZ7	34A-546	121A049
L-7	Coil, Plate/cathode coupling	31B-629	121A050
L-8	Choke, Heater; 6J6	31B-575	121A051
L-9	Coil, Output peaking adj.	31B-682	121A150
L-10	Coil, Peaking; 6J6 plate	31B638-1	121A151
L-11	Coil, Neutralizing	34A-680	121A152
L-12	Trap, fixed antenna; wound on C-1	31B-649	121A153
L-13	Trap, fixed antenna; wound on C-2 (Black)	31B-601	121A154
L-14	Trap, 40-54 MC antenna	31B-289	121A155
	CAPACITORS		
C-1	68 mmf. 500 V., ceramic; part of L-12	-------	-------
C-2	68 mmf. 500 V., ceramic; part of L-13	-------	-------
C-3	0.5 to 3 mmf. ceramic trimmer; r-f plate adj.	31A-056	121A158
C-4	800 mmf. 500 V., GMV. ceramic feed-thru	31D-196	121A156
C-5	3.0 mmf. ± .25 mmf. NPO. ceramic disc	13L8C-030C	121A157
C-6	0.5 to 3 mmf. ceramic trimmer; mixer grid adj.	31A-056	121A158
C-7	1000 mmf. 500 V., GMV. ceramic disc	13L8X-102Z	121A159
C-8	5.0 mmf. ± .25 mmf. N900 ceramic disc	13L8UA-050C	121A160
C-9	47 mmf. 10% N1400 ceramic disc	13L8Q-470K	121A161
C-10	10 mmf. 10% NPO ceramic disc	13L10C-100K	121A162
C-11	6.8 mmf. ± .4 mmf. NPO ceramic disc	13L8C-6R81	121A163
C-12	120 mmf. 10% 500 V., ceramic disc	13L8D-121K	121A164
C-13	3 to 9 mmf. ceramic trimmer; r-f grid adj.	31A-079	44A434
C-14	800 mmf. 500 V., GMV. ceramic feed-thru	13D-153	121A048
C-15	800 mmf. GMV. 500 V., ceramic feed-thru	13D-153	121A048
C-16	800 mmf. GMV. 500 V., ceramic feed-thru	13D-153	121A048
C-17	800 mmf. GMV. 500 V., ceramic feed-thru	13D-153	121A048
C-18	1000 mmf. GMV. 500 V., ceramic disc	13L8X-102Z	121A159
C-19	Fine Tuning Air Trimmer	See Miscellaneous Parts	
C-20	75 mmf. 3% 500 V., N470 ceramic disc	13XR1-30TU750H.	121A166
C-21	1000 mmf. GMV. 500 V., ceramic disc	13L8X-102Z	121A159
C-22	1000 mmf. GMV. 500 V., ceramic disc	13L8X-102Z	121A159
C-23	3 to 9 mmf. ceramic trimmer; 40-54 mc. trap	31A-079	44A434
C-24	3.0 mmf. ± .5 mmf. NPO ceramic disc	13L8C-030D	121A167
C-25	Wire Gimmick	31B-120	121A168
	RESISTORS		
R-1	330,000 ohms 1/2 watt, carbon	12TAE334K	23X20X334K
R-2	220,000 ohms 1/2 watt, carbon	12TAE224K	23X20X224K
R-3	222,000 ohms 1/2 watt, carbon	12TAE224K	23X20X224K
R-4	15,000 ohms 1/2 watt, carbon	12TAE153K	23X20X153K
R-5	470 ohms 1/2 watt, carbon	12TAE471K	23X20X471K
R-6	4700 ohms 1/2 watt, carbon	12TAE472K	23X20X472K
R-7	10,000 ohms 1/2 watt, carbon	12TAE103K	23X20X103K
R-8	15,000 ohms 1/2 watt, carbon	12TAE153K	23X20X153K
R-9	47,000 ohms 1/2 watt, carbon	12TAE473K	23X20X473K
R-10	15,000 ohms 1/2 watt, carbon	12TAE153K	23X20X153K

SERVICE PARTS LISTS FOR 1E1855 VHF TUNERS (Cont.)

MISCELLANEOUS

Schematic Symbol	*	Description	Mfgrs. Cross Reference	Hallicrafters Part Number
V-1	1	Tube, R-F amplifier	6BZ7	90X6BZ7
V-2	2	Tube, Oscillator Mixer	6J6	90X6J6
	3	Shield, R-F tube	16S-010	121A169
	4	Shield, Oscillator/mixer tube	16S-009	121A170
	5	Shield, side	31B-143	121A046
	6	Shield, bottom cover	31B-103	121A045
	7	Roller, detent	31B-016	121A027
	8	Spring, detent	31B-005	121A031
	9	Spring, front shaft retaining	31B-030	121A030
	10	Spring, rear shaft retaining	31B-030	121A030
	11	Spring, fine tuning shaft ground	Part of drum assembly	
	12	Plate, fine tuning ground	31B-124	121A171
	13	Strap, fine tuning mounting	31B-021	76A1096
	14	Washer, fiber	11D-022	121A028
	15	Fine tuning hot plate and lead	31B-252	87A4174
C-13	16	Trimmer, ceramic; with lead; r-f grid	31A-079	121A063
C-3	17	Trimmer, ceramic; with lead; r-f	31A-056	121A060
C-6	18	Trimmer, ceramic; with lead; mixer grid	31A-056	121A060
	19	Nut, trimmer spring	10E-401	121A257
	20	Screw, trimmer adjustment	9A-410-7	121A061
	21	Contact bracket assembly	31B-278	121A044
C-23	22	Trimmer, ceramic; with lead; 40-54 mc trap	31A-079	121A063
	25	Core, oscillator adjustment	31B-041	121A172
	26	Spring, core retaining	31A-010	121A034
	27	"C" Ring	31A-152	121A105
	28	Fine tuning shaft and spring	31A-083-14	121A173
	29	Drum assembly, less coils; with fine tuning shaft and blade	31B-701-16	121A174
	38	Core, I-F output coil adjustment	20C-055	77A631
L-9	40	Coil, I-F output; complete assembly	31B-682	121A175
L-1, 2	41	Antenna strip, Channel 2	31M-012-2R	121A176
L-1, 2	42	Antenna strip, Channel 3	31M-012-3R	121A177
L-1, 2	43	Antenna strip, Channel 4	31M-012-4R	121A178
L-1, 2	44	Antenna strip, Channel 5	31M-012-5R	121A179
L-1, 2	45	Antenna strip, Channel 6	31M-012-6R	121A180
L-1, 2	46	Antenna strip, Channel 7	31M-012-7R	121A181
L-1, 2	47	Antenna strip, Channel 8	31M-012-8R	121A182
L-1, 2	48	Antenna strip, Channel 9	31M-012-9R	121A183
L-1, 2	49	Antenna strip, Channel 10	31M-012-10R	121A184
L-1, 2	50	Antenna strip, Channel 11	31M-012-11R	121A185
L-1, 2	51	Antenna strip, Channel 12	31M-012-12R	121A186
L-1, 2	52	Antenna strip, Channel 13	31M-012-13R	121A187
L-3,4,5	53	Oscillator strip, Channel 2	31M-112-2R	121A188
L-3,4,5	54	Oscillator strip, Channel 3	31M-112-3R	121A189
L-3,4,5	55	Oscillator strip, Channel 4	31M-112-4R	121A190
L-3,4,5	56	Oscillator strip, Channel 5	31M-112-5R	121A191
L-3,4,5	57	Oscillator strip, Channel 6	31M-112-6R	121A192
L-3,4,5	58	Oscillator strip, Channel 7	31M-112-7R	121A193
L-3,4,5	59	Oscillator strip, Channel 8	31M-112-8R	121A194
L-3,4,5	60	Oscillator strip, Channel 9	31M-112-9R	121A195
L-3,4,5	61	Oscillator strip, Channel 10	31M-112-10R	121A196
L-3,4,5	62	Oscillator strip, Channel 11	31M-112-11R	121A197
L-3,4,5	63	Oscillator strip, Channel 12	31M-112-12R	121A198
L-3,4,5	64	Oscillator strip, Channel 13	31M-112-13R	121A199
	--	Socket, 9 pin; R-F tube	27B-014	121A200
	--	Socket, 7 pin; Osc. Mixer tube	27A-016	121A201

* Refers to Corresponding Number in Fig. 544CA.

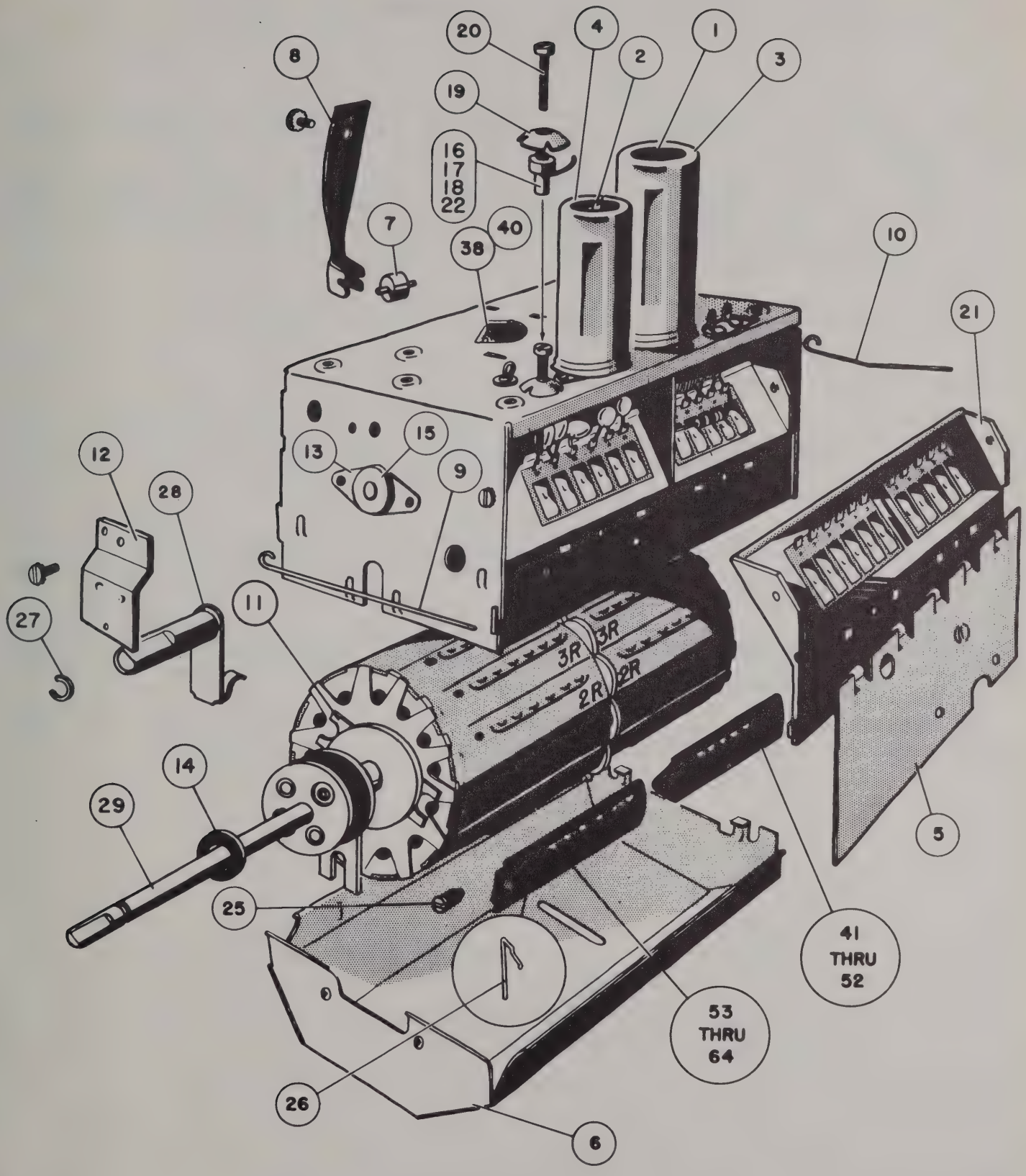


Fig. 544CA. Exploded View of 1E1852 Cascode TV Tuner

SERVICING THE 1E1660 and 1E1855 UHF TUNERS

The UHF tuner incorporated in the UHF-VHF models in the 1300D series is a compact unit that continuously tunes UHF Channels 14 through 83. The intermediate frequency output of the tuner, 41 megacycles, is fed through a special cascode amplifier. The output of this circuit is then fed into the standard I-F section of the receiver.

The nature of the circuits used to tune the UHF television band is such that service problems not previously found in AM and FM radio and VHF television may be encountered. Service on these tuners is limited to replacement of the oscillator tube, harmonic crystal, mixer crystal, harmonic crystal biasing circuit, and components in the I-F circuits. Other components can not be replaced in the field without disturbing UHF circuits. It is necessary to duplicate lead length, dress, and components placement in making permissable replacements.

THE HALLICRAFTERS SERVICE DEPARTMENT PROVIDES A TUNER EXCHANGE SERVICE FOR A NOMINAL FEE. THE SERVICE TECHNICIAN IS URGED TO AVAIL HIMSELF OF THIS SERVICE.

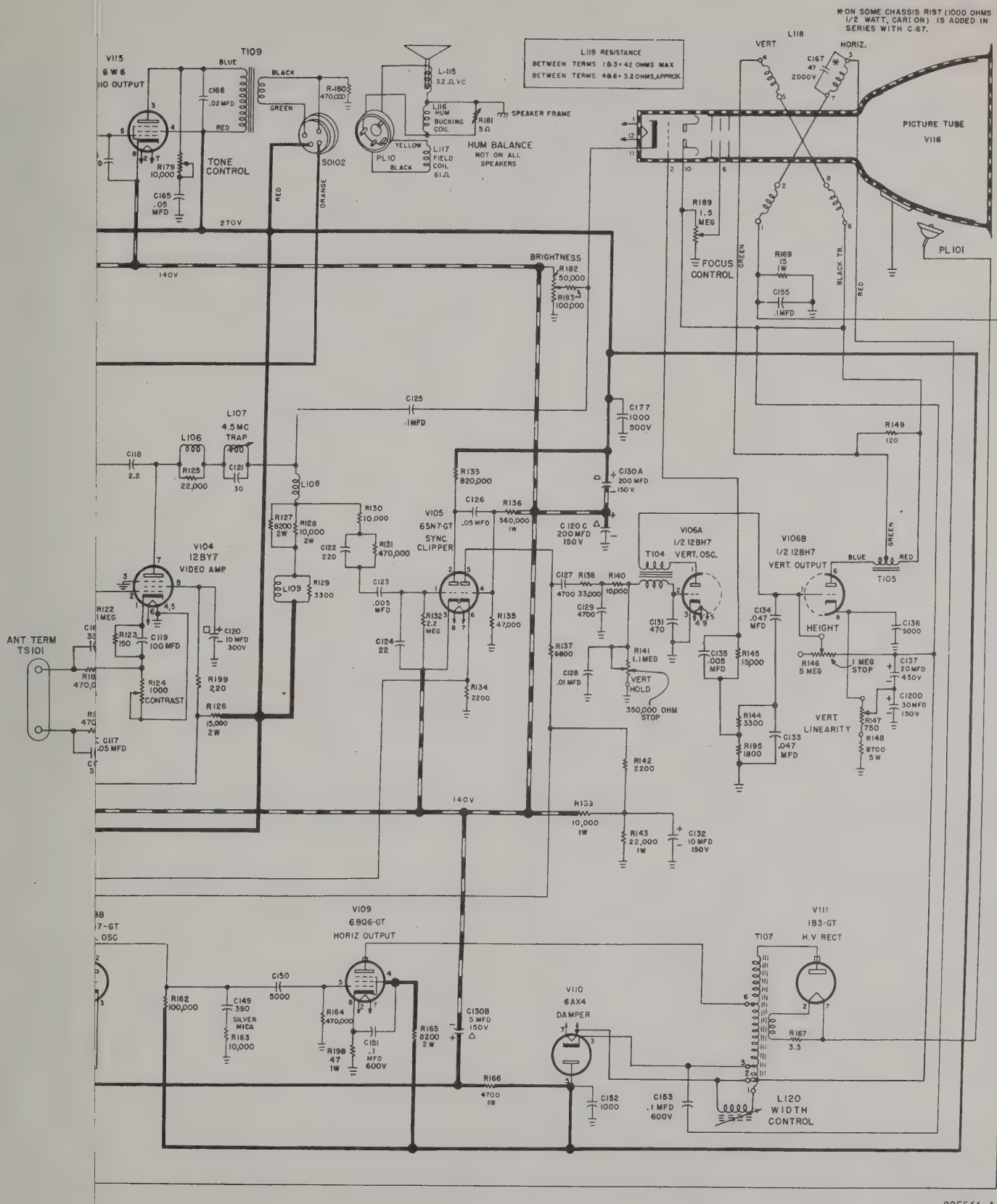
The mixer and harmonic crystals may be replaced with one of the original type used. Try several crystals of the correct type until one is found which duplicates the original operation of the Tuner.

To remove the mixer crystal, remove the small shield on the tuner top plate. Unsolder the crystal leads with a pencil type low wattage iron. Be careful not to disturb placement of the I-F circuit components. Solder the new crystal into position with a pencil type iron and low temperature solder. When applying heat, hold the end of the lead nearest the crystal body with a long nose pliers to conduct heat away from the crystal. After replacing the crystal, secure the shield in its original position.

To remove the harmonic crystal, remove the bottom cover of the tuner, which is secured by two hex head screws. Follow the soldering procedure described above for the mixer crystal. After replacing the crystal, secure the bottom cover in its original position. Be careful not to disturb UHF circuits in replacing the harmonic crystal. NOTE: The harmonic crystal will be found only on the 1E1660 tuner.

Replacement of the oscillator tube affects tracking and sensitivity. Substitute each of several new tubes, until one is found which restores the Tuner to its original operating conditions. The variation of Tuner performance with tubes is due to small differences in tube characteristics. If no satisfactory oscillator tube can be found, install a new tube and perform the oscillator alignment described on page 1953-522C.

Replacement of components, other than those discussed above, will seriously disturb tuning of critical UHF circuits, and must not be attempted in the field.



89F561-1

VHF
17" CHASSIS
A1300D
RUN 1

SERVICING THE 1E1660 and 1E1855 UHF TUNERS

The UHF tuner incorporated in the UHF-VHF models in the 1300D series is a compact unit that continuously tunes UHF Channels 14 through 83. The intermediate frequency output of the tuner, 41 megacycles, is fed through a special cascode amplifier. The output of this circuit is then fed into the standard I-F section of the receiver.

The nature of the circuits used to tune the UHF television band is such that service problems not previously found in AM and FM radio and VHF television may be encountered. Service on these tuners is limited to replacement of the oscillator tube, harmonic crystal, mixer crystal, harmonic crystal biasing circuit, and components in the I-F circuits. Other components can not be replaced in the field without disturbing UHF circuits. It is necessary to duplicate lead length, dress, and components placement in making permissable replacements.

THE HALLICRAFTERS SERVICE DEPARTMENT PROVIDES A TUNER EXCHANGE SERVICE FOR A NOMINAL FEE. THE SERVICE TECHNICIAN IS URGED TO AVAIL HIMSELF OF THIS SERVICE.

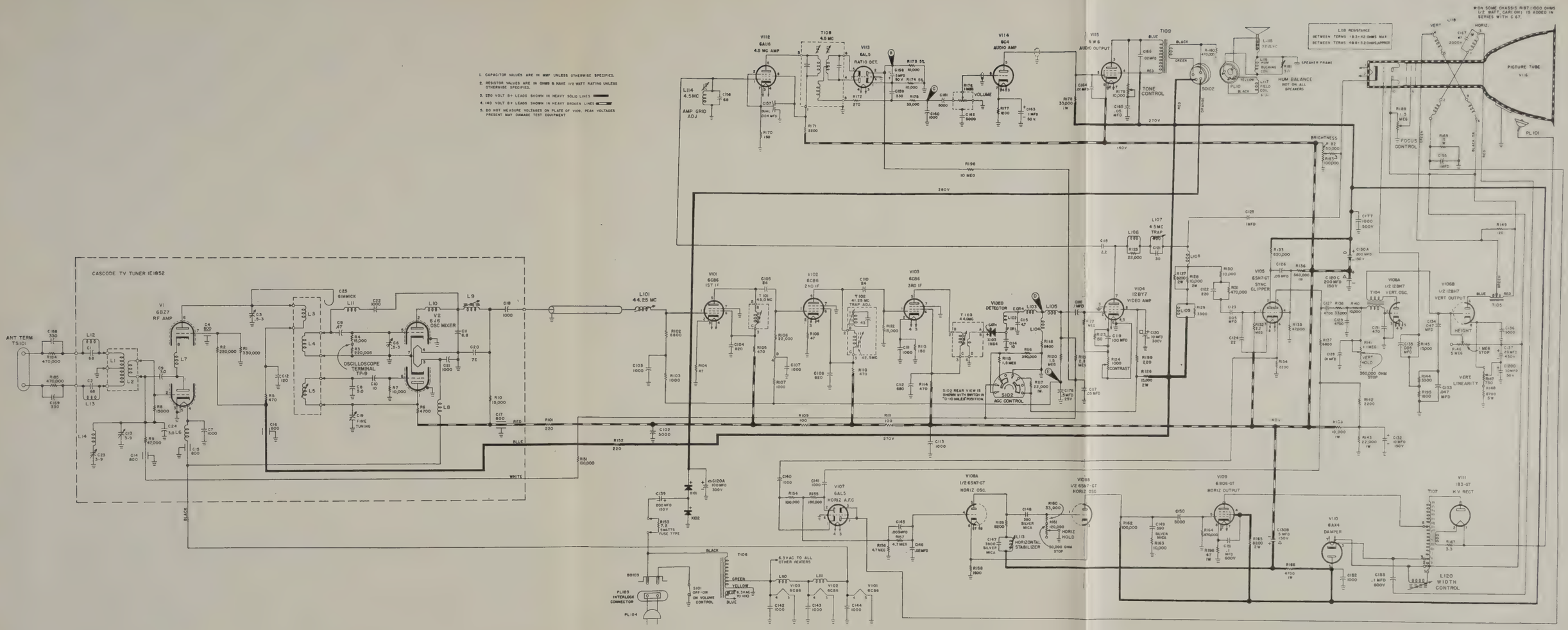
The mixer and harmonic crystals may be replaced with one of the original type used. Try several crystals of the correct type until one is found which duplicates the original operation of the Tuner.

To remove the mixer crystal, remove the small shield on the tuner top plate. Unsolder the crystal leads with a pencil type low wattage iron. Be careful not to disturb placement of the I-F circuit components. Solder the new crystal into position with a pencil type iron and low temperature solder. When applying heat, hold the end of the lead nearest the crystal body with a long nose pliers to conduct heat away from the crystal. After replacing the crystal, secure the shield in its original position.

To remove the harmonic crystal, remove the bottom cover of the tuner, which is secured by two hex head screws. Follow the soldering procedure described above for the mixer crystal. After replacing the crystal, secure the bottom cover in its original position. Be careful not to disturb UHF circuits in replacing the harmonic crystal. NOTE: The harmonic crystal will be found only on the 1E1660 tuner.

Replacement of the oscillator tube affects tracking and sensitivity. Substitute each of several new tubes, until one is found which restores the Tuner to its original operating conditions. The variation of Tuner performance with tubes is due to small differences in tube characteristics. If no satisfactory oscillator tube can be found, install a new tube and perform the oscillator alignment described on page 1953-522C.

Replacement of components, other than those discussed above, will seriously disturb tuning of critical UHF circuits, and must not be attempted in the field.



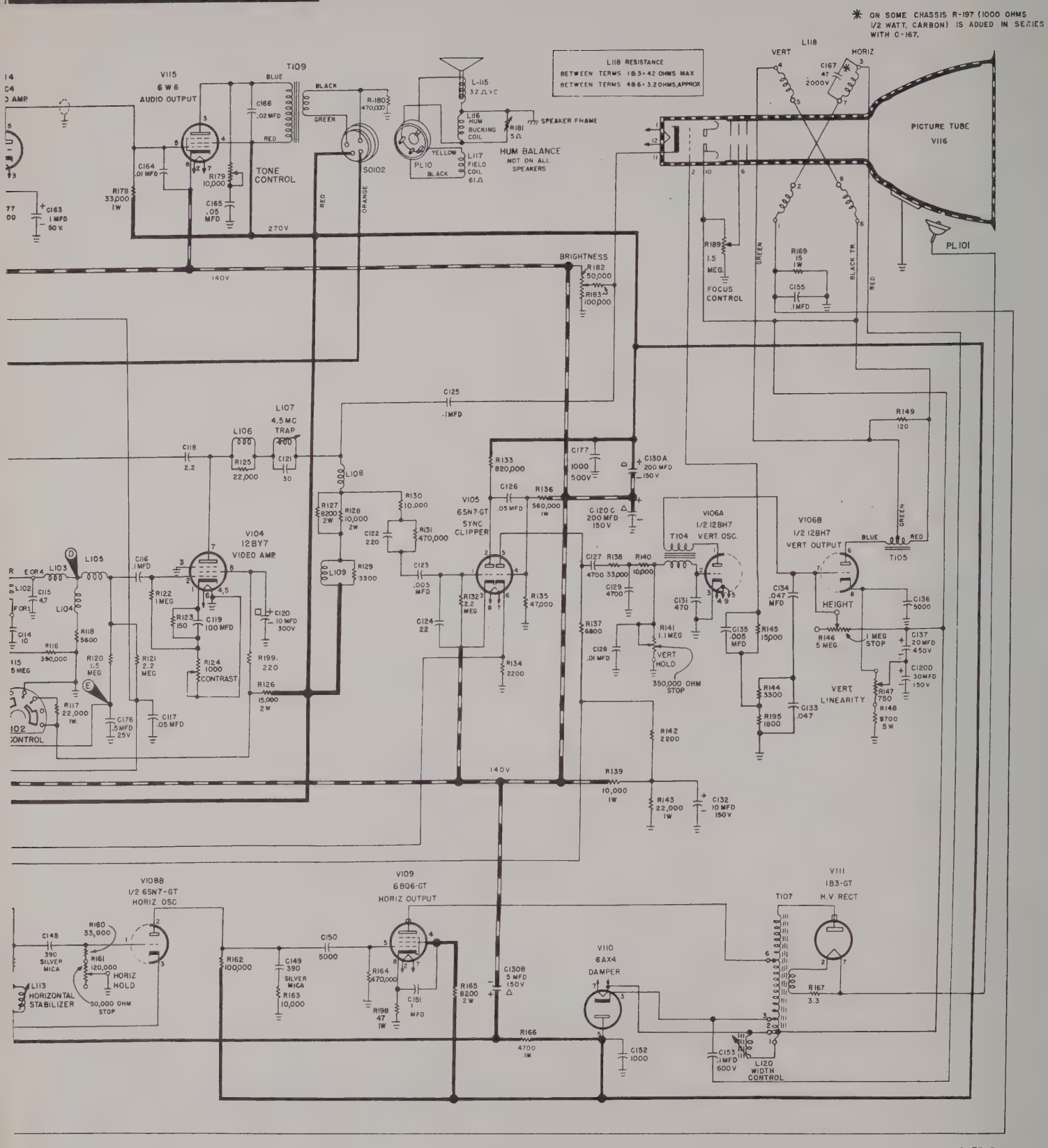
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89F561-1

VHF
17" CHASSIS

A1300D
RUN 1

98X1198-1
1053



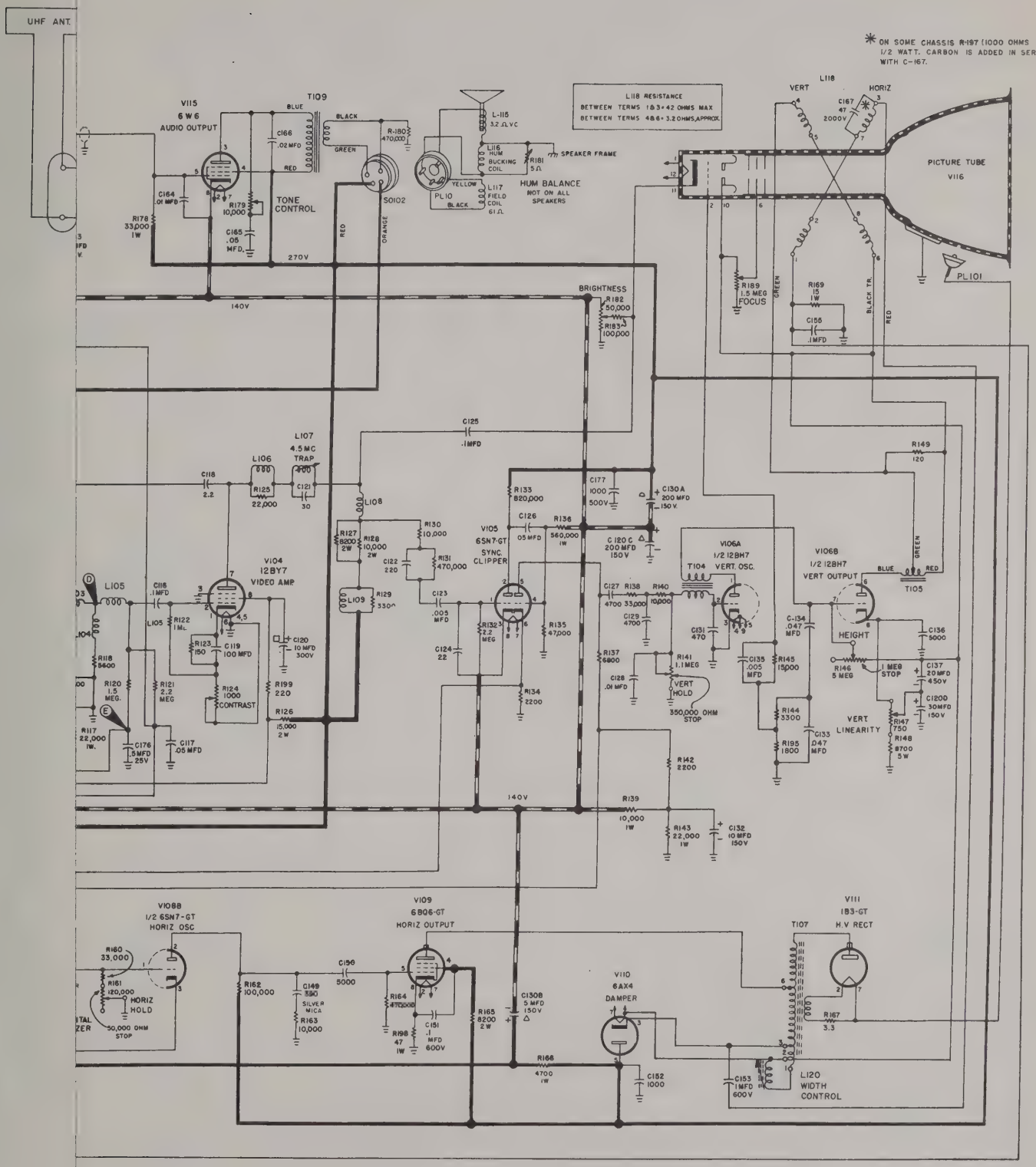
89F565-1

VHF

17" CHASSIS

A1300D

RUN 2



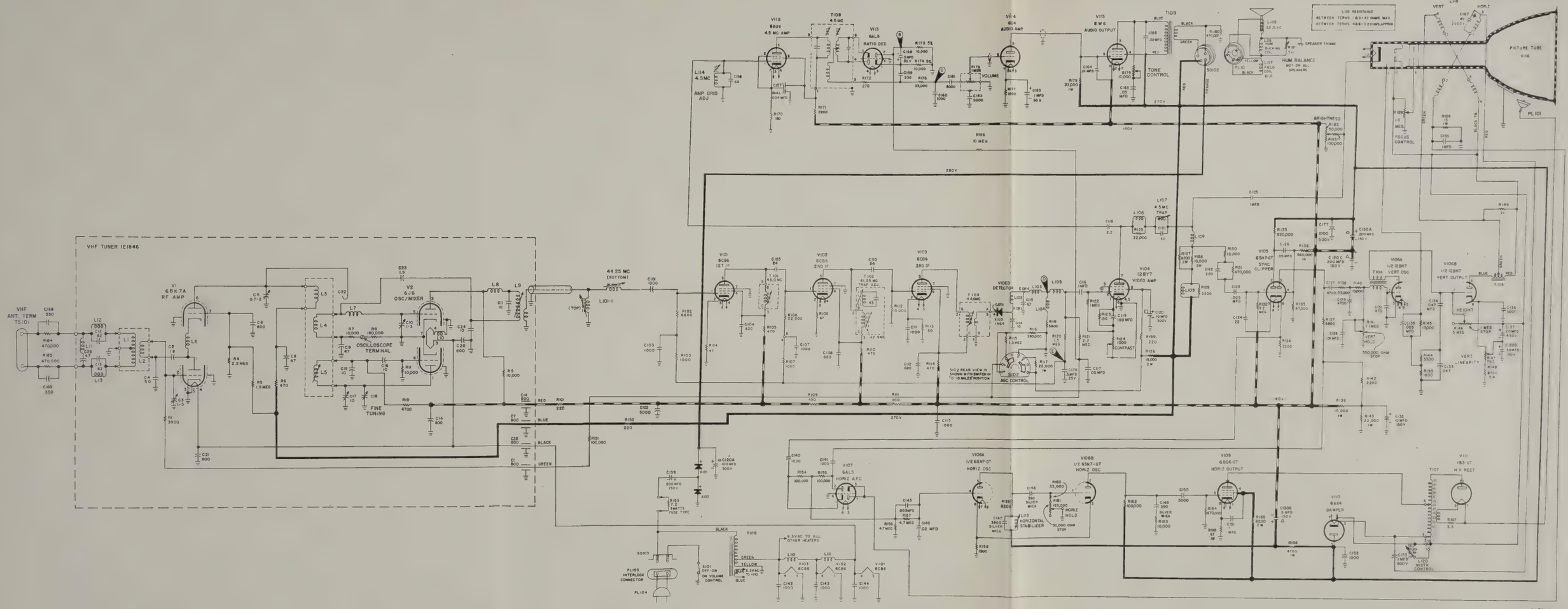
89F563-1

VHF-UHF
17" CHASSIS

B1300D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 270 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES ━━
4. 140 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES ━ ━
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.

* ON SOME CHASSIS R-197 (1000 OHMS 1/2 WATT, CARBON) IS ADDED IN SERIES WITH C-167.



89F5e5-1

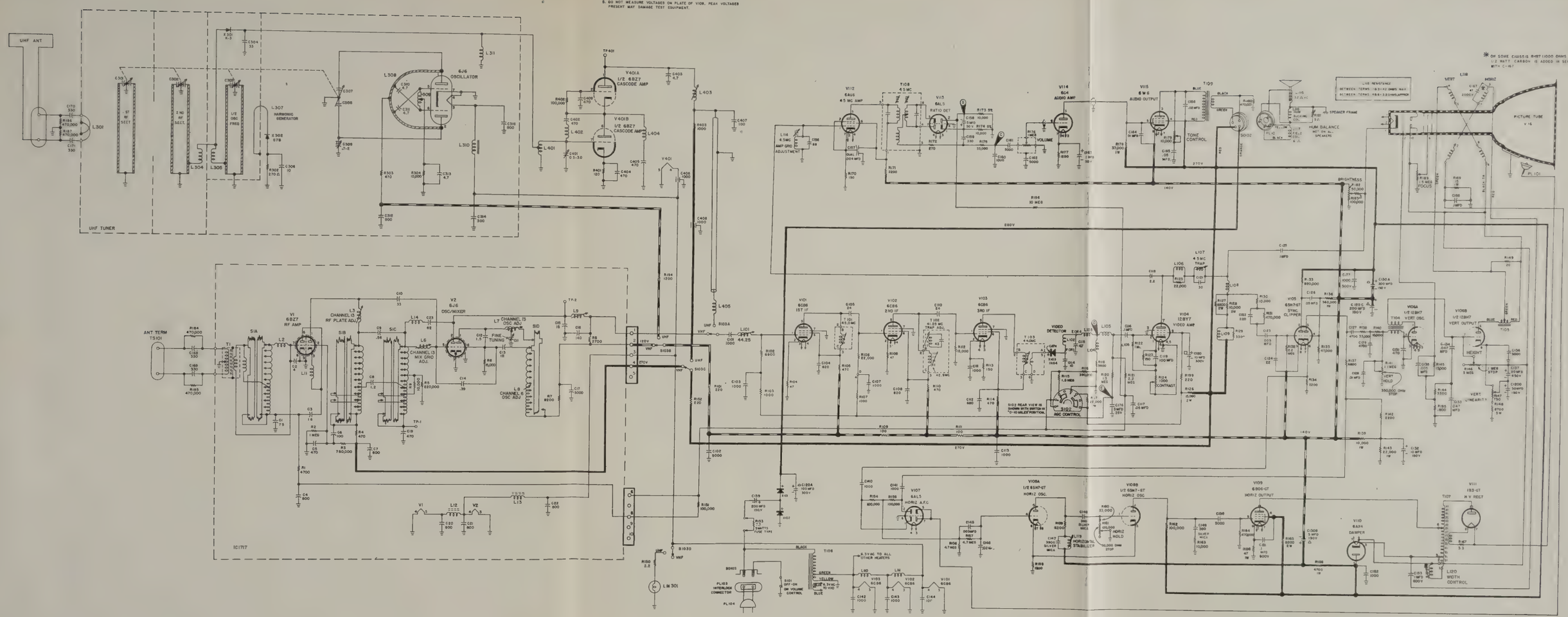
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF

17" CHASSIS

A1300D

RUN 2



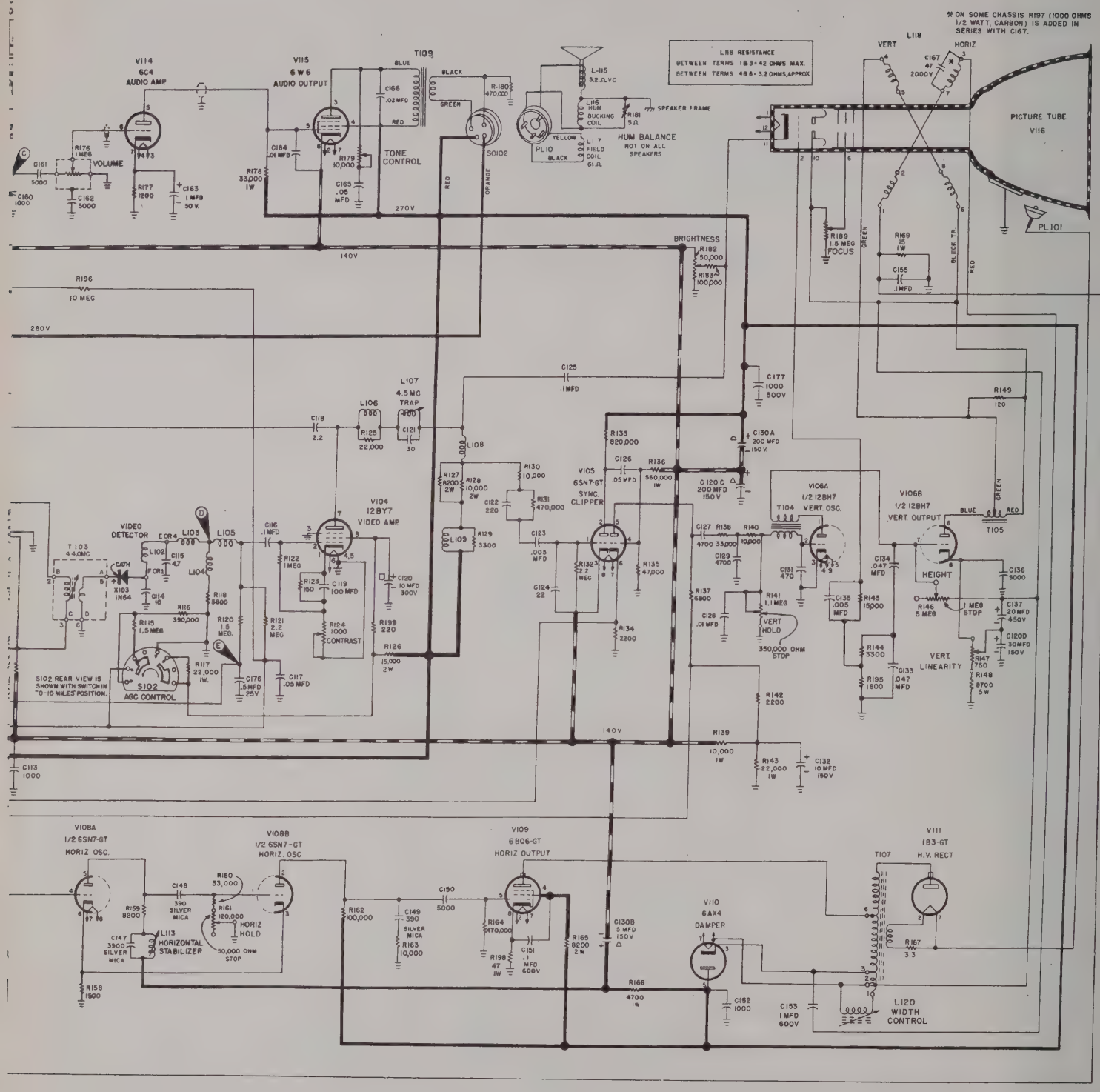
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

94X1198-1
1953

VHF-UHF 17" CHASSIS

B1300D

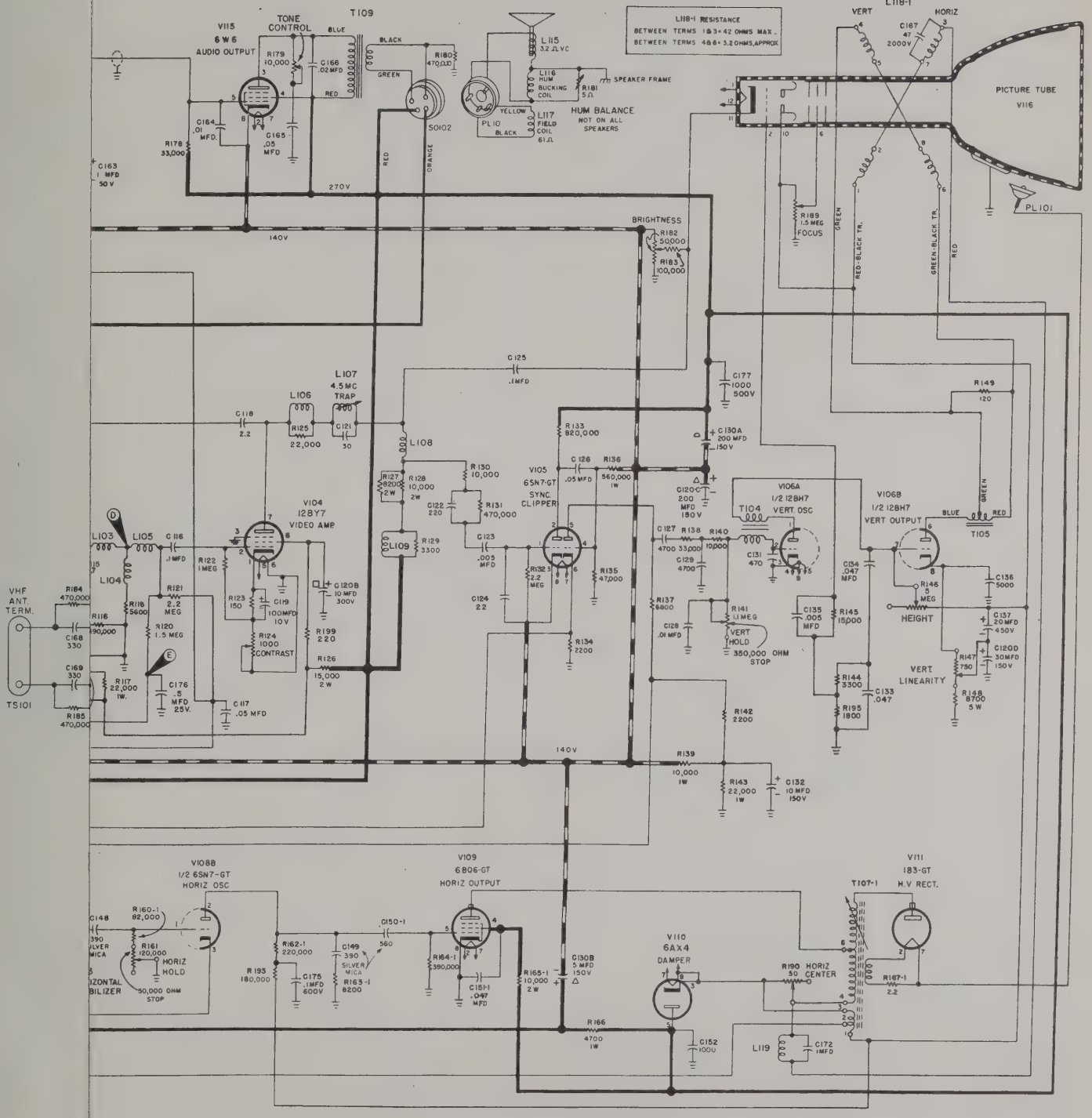
RUN 1



89F566-1

VHF-UHF
17" CHASSIS

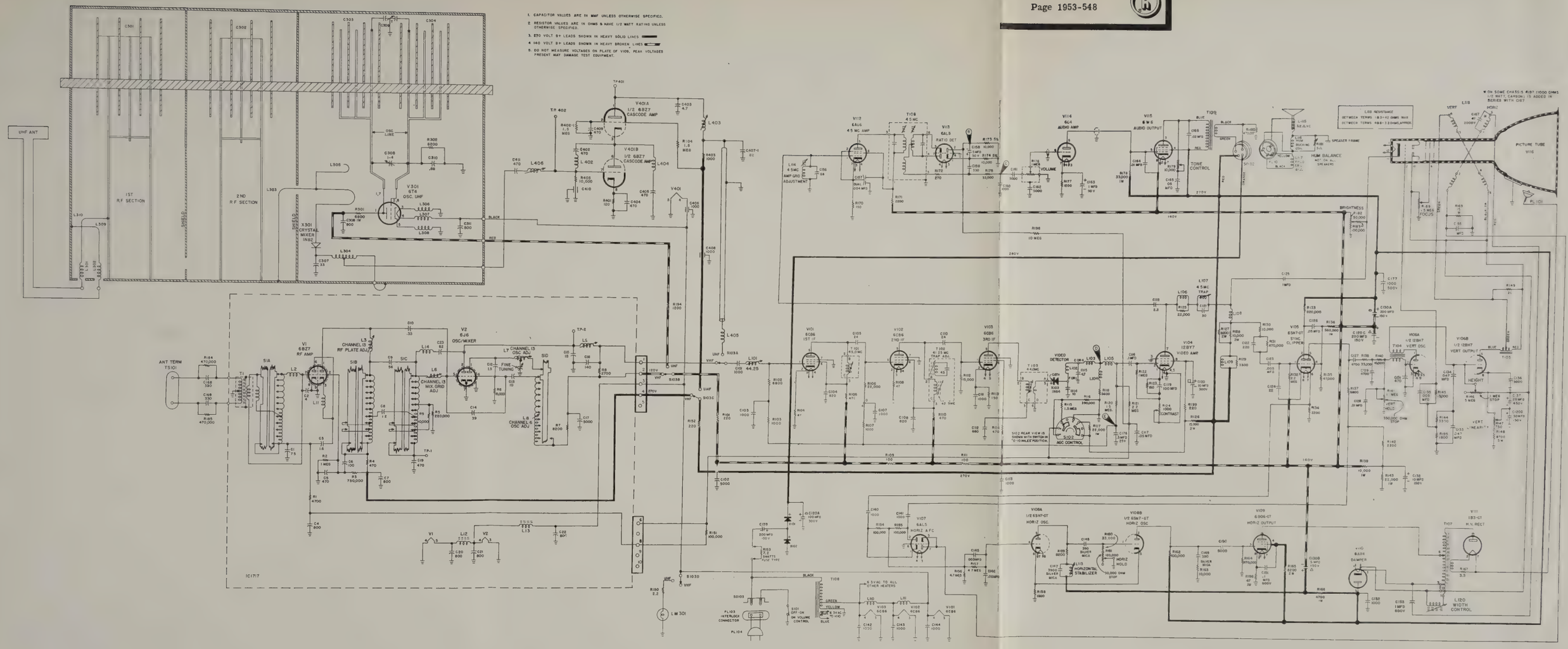
B1300D
RUN 2



89F562-1

VHF
17" CHASSIS

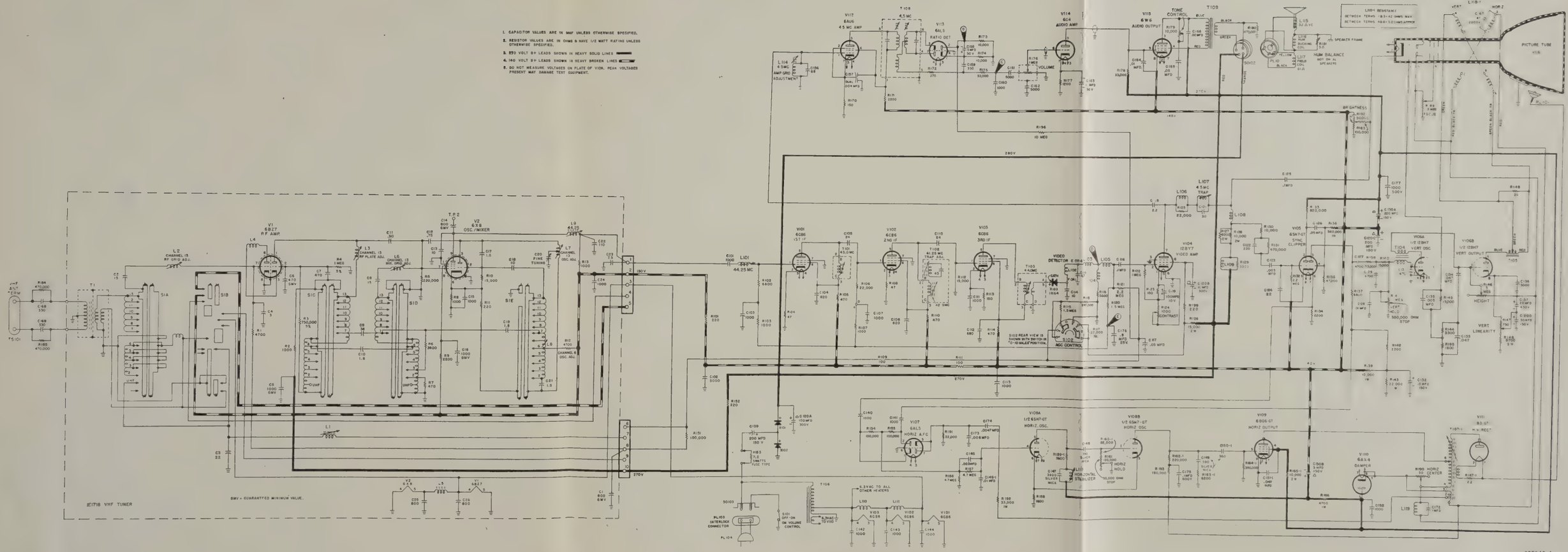
C1300D
RUN 1

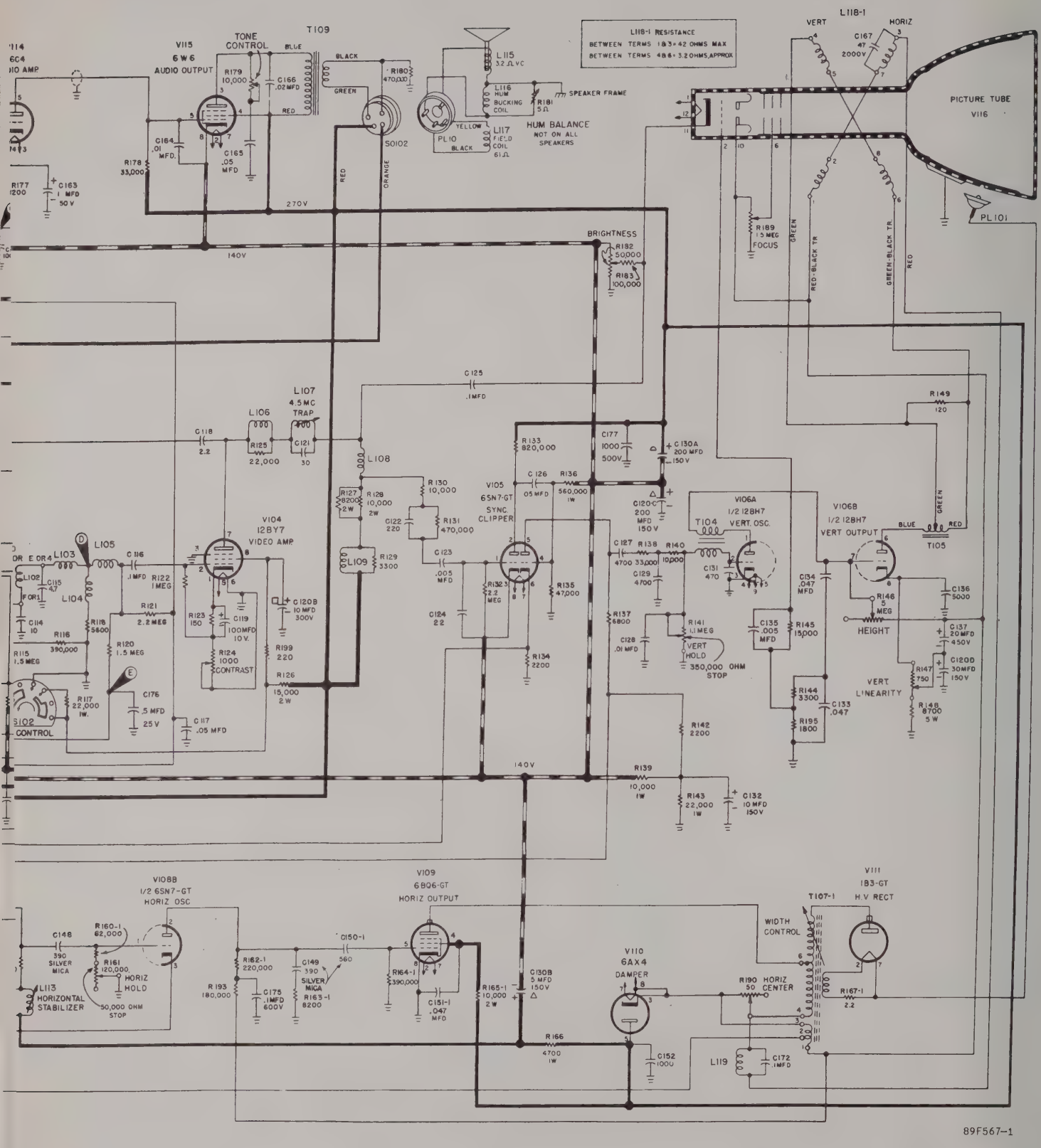


VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF-UHF
17" CHASSIS

B1300D
RUN 2

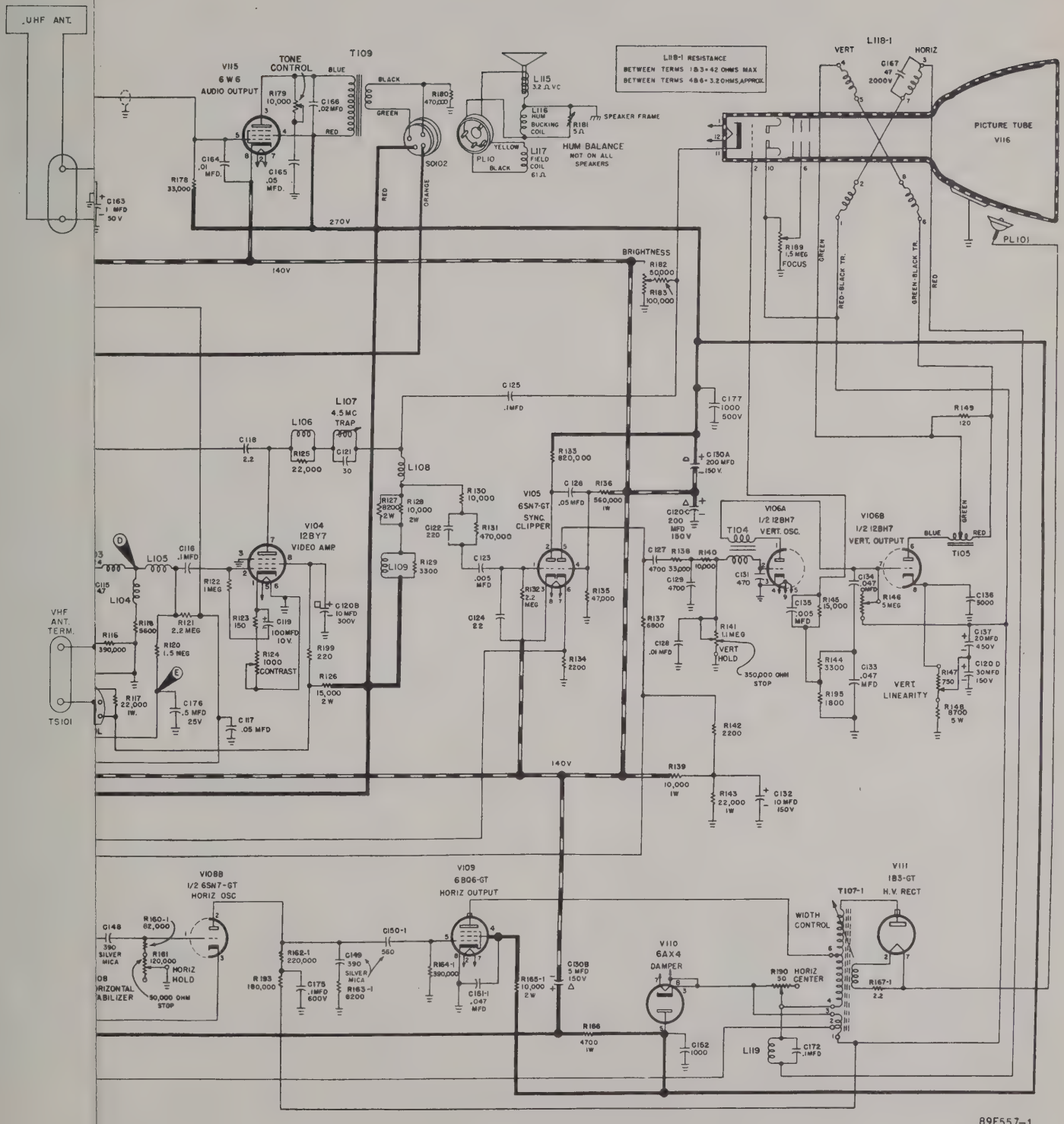

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 270 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES
4. 140 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES
5. DO NOT MEASURE VOLTAGES ON PLATE OF V10M. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.
VHF ANT. 300Ω
T1
S1A
S1B
S1C
S1D
S1E
L1
L2 CHANNEL 13 RF GRID ADJ.
L3 CHANNEL 13 RF PLATE ADJ.
L4
L5 CHANNEL 13 MIX. GRID ADJ.
L6 CHANNEL 13 OSC. GRID ADJ.
L7 CHANNEL 13 OSC. ADJ.
L8
L9 44.25 MC
L10
L11
L12 CHANNEL 6 OSC. ADJ.
V1 6BZ7 RF AMP
V2 6X8 OSC./MIXER
V3 6CB6 1ST IF
V4 6CB6 2ND IF
V5 6CB6 3RD IF
V6 6AU6 4.5 MC AMP
V7 6AL5 HORIZ A.F.C.
V8 6AL5 RATIO DET.
V9 6W6 AUDIO OUTPUT
V10A 1/2 6SN7-GT HORIZ. OSC.
V10B 1/2 6SN7-GT HORIZ OSC.
V11 6X4 H.V. RECT.
V12 12BH7 VERT. OSC.
V13 12BY7 VERT. OUTPUT
V14 12BY7 VIDEO AMP
V15 6SH7-GT SYNC CLIPPER
V16 6CB6 AMPLIFIER
V17 6AU6 4.5 MC AMP
V18 6AL5 AUDIO AMP
V19 6BQ6-GT HORIZ OUTPUT
V20 6AL5 DAMPER
T101
T102 41.25 MC TRAP ADJ.
T103 4.5MC
T104 VERT OSC.
T105 VERT LINEARITY
T106
T107
T108 4.5 MC
T109
L101
L102 4.5MC TRAP
L103 4.5MC AMP GRID ADJUSTMENT
L104
L105
L106 4.5MC TRAP
L107 4.5MC TRAP
L108
L109
L110
L111
L112
L113
L114 4.5MC AMP GRID ADJUSTMENT
L115 82 μH VC
L116 HUM BUCKING COIL
L117 FIELD COIL
L118
L119
L120
TONE CONTROL
VOLUME
BRIGHTNESS
CONTRAST
HEIGHT
VERT LINEARITY
VERT HOLD
HORIZ HOLD
HORIZONTAL STABILIZER
AGC CONTROL
VIDEO DETECTOR
SYNC CLIPPER
HUM BALANCE
PICTURE TUBE
SPEAKER FRAME
SW1 OFF-ON VOLUME CONTROL
SW2 REAR VIEW IS SHOWN WITH SWITCH IN "0-10 MILES" POSITION.
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SW11
SW12
SW13
SW14
SW15
SW16
SW17
SW18
SW19
SW20
SW21
SW22
SW23
SW24
SW25
SW26
SW27
SW28
SW29
SW30
SW31
SW32
SW33
SW34
SW35
SW36
SW37
SW38
SW39
SW40
SW41
SW42



89F567-1

VHF
17" CHASSIS

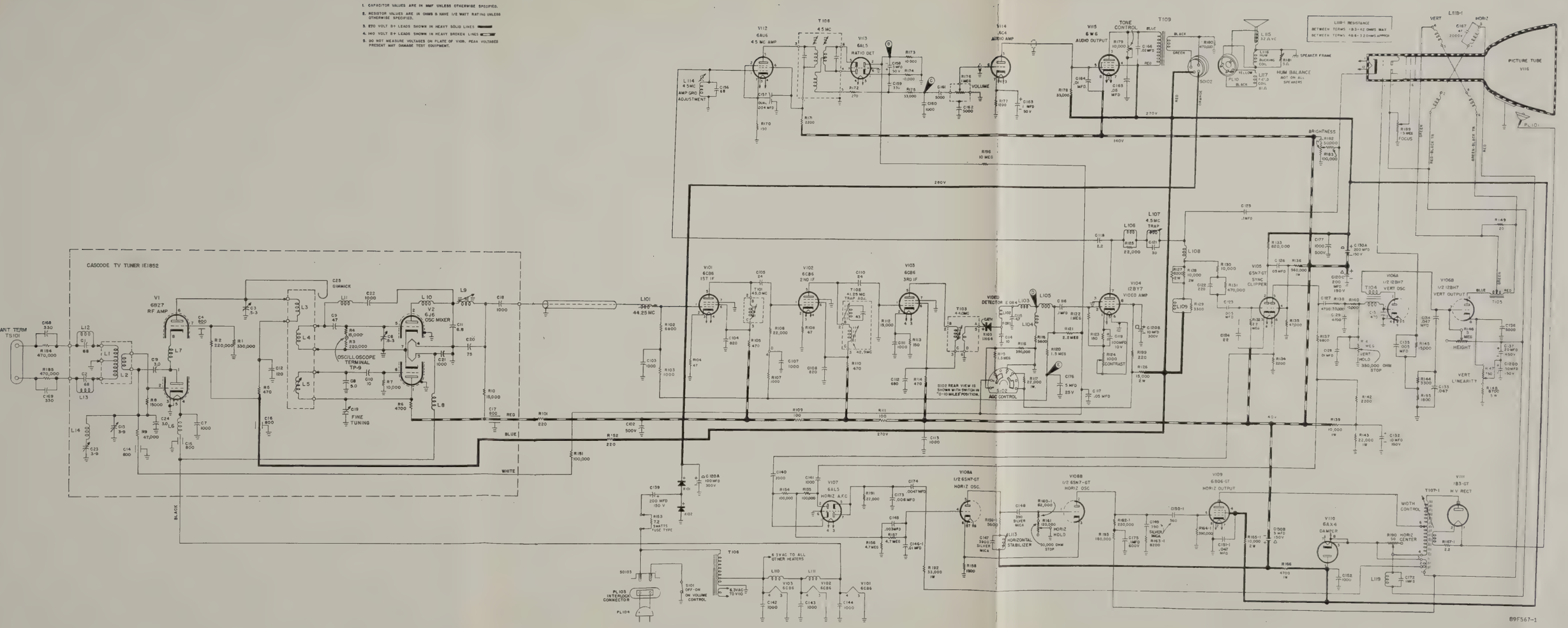
C1300D
RUN 2



89F557-1

VHF-UHF
17" CHASSIS

D1300D
RUN 1

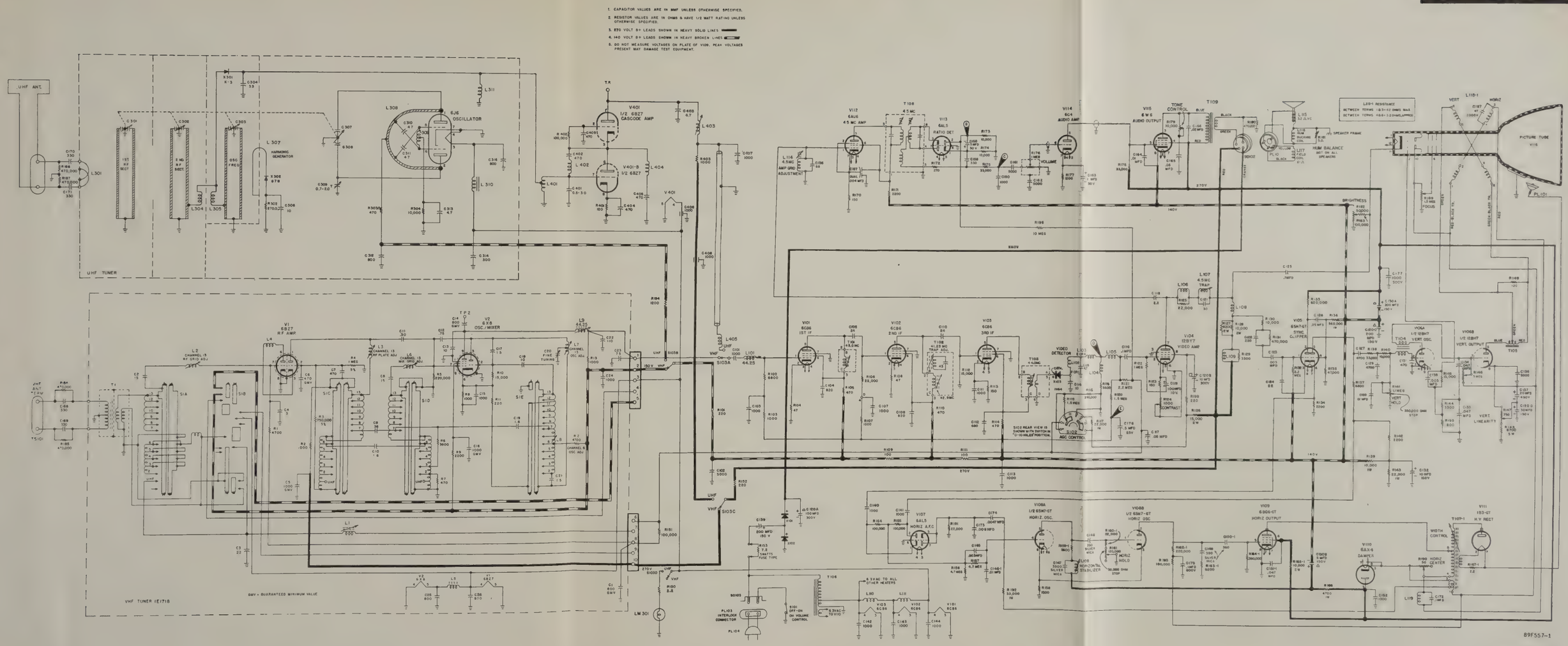


VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

94X1198-1
1053

VHF
17" CHASSIS

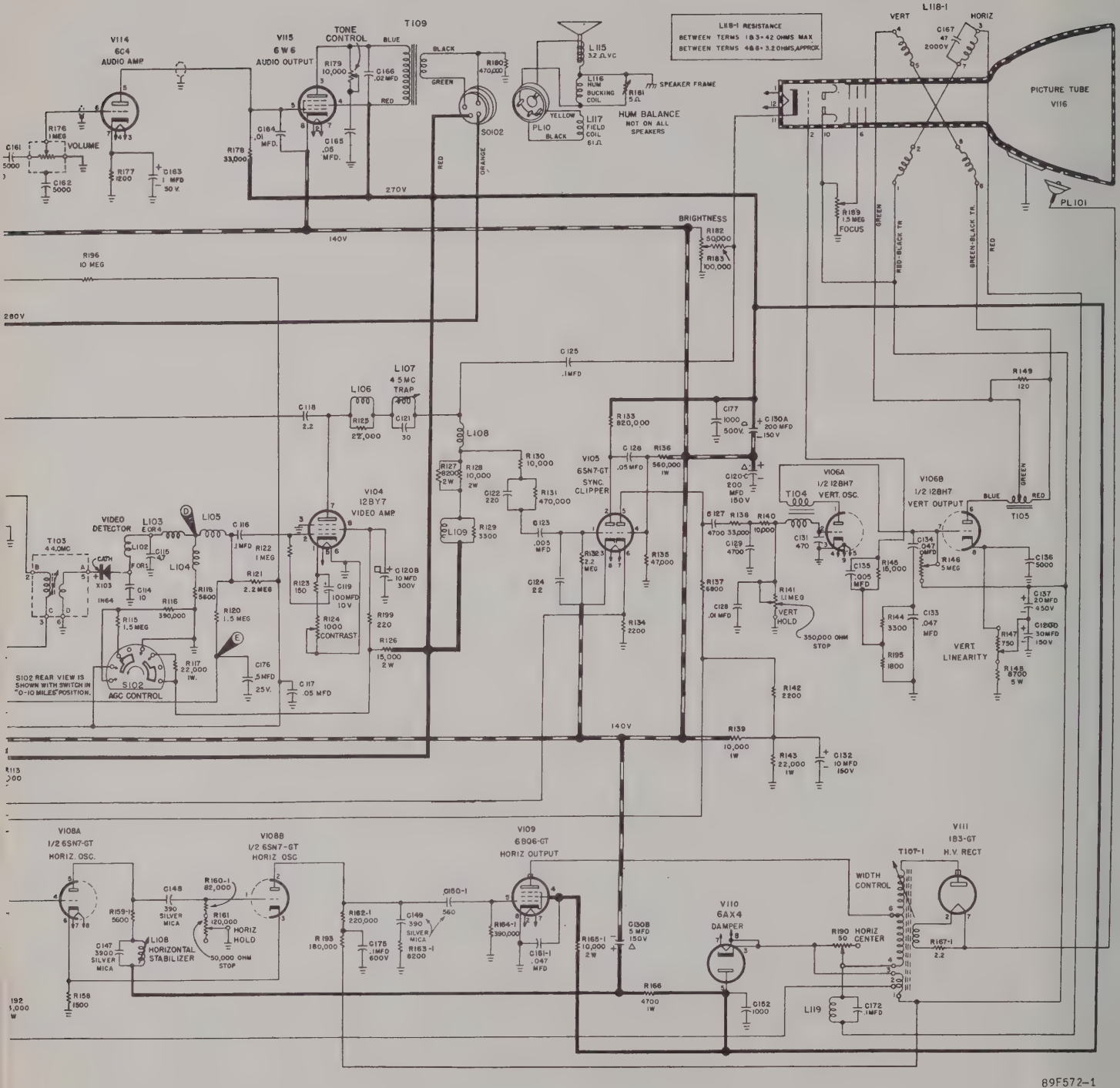
C1300D
RUN 2



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

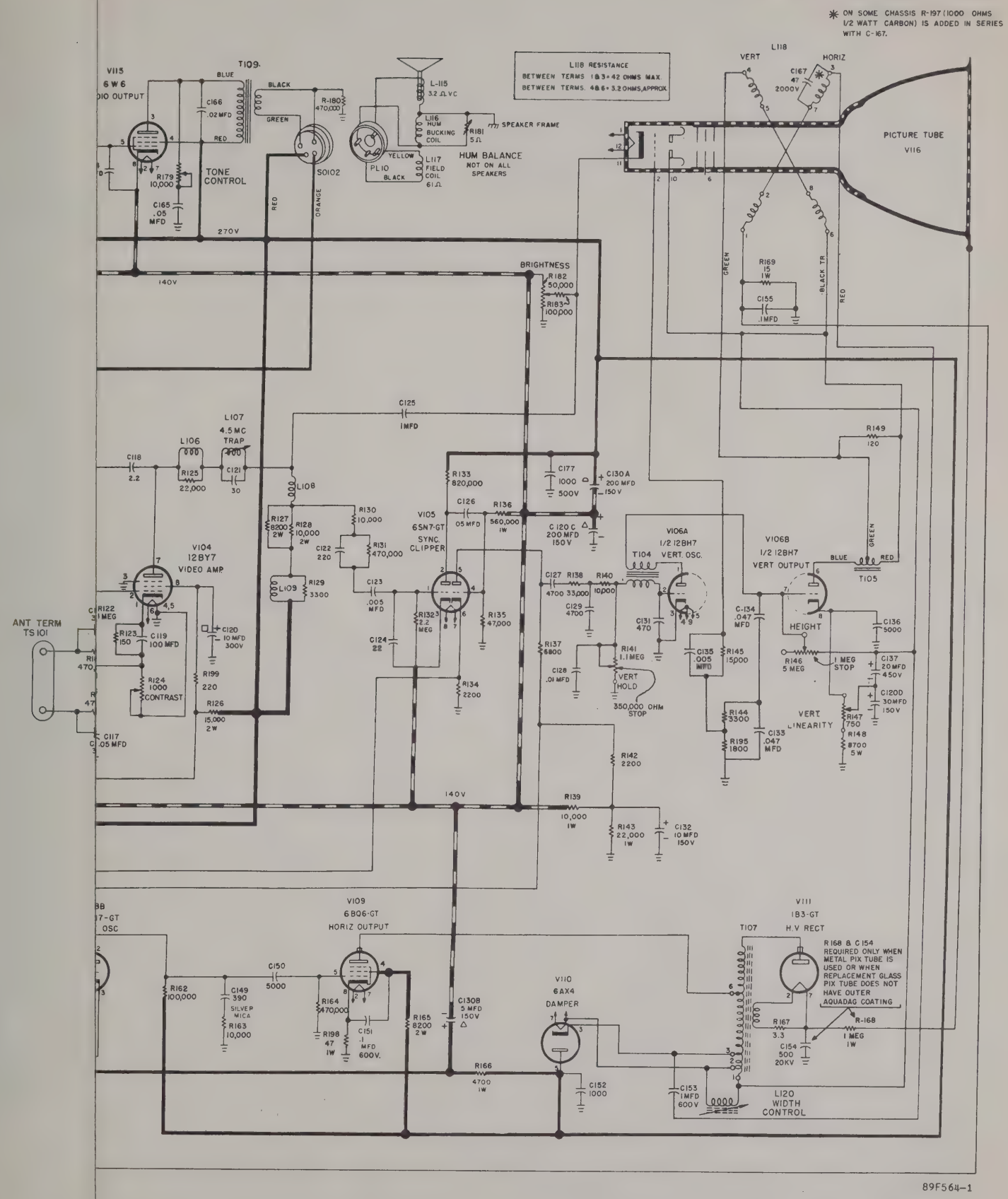
VHF-UHF
17" CHASSIS

D1300D
RUN 1

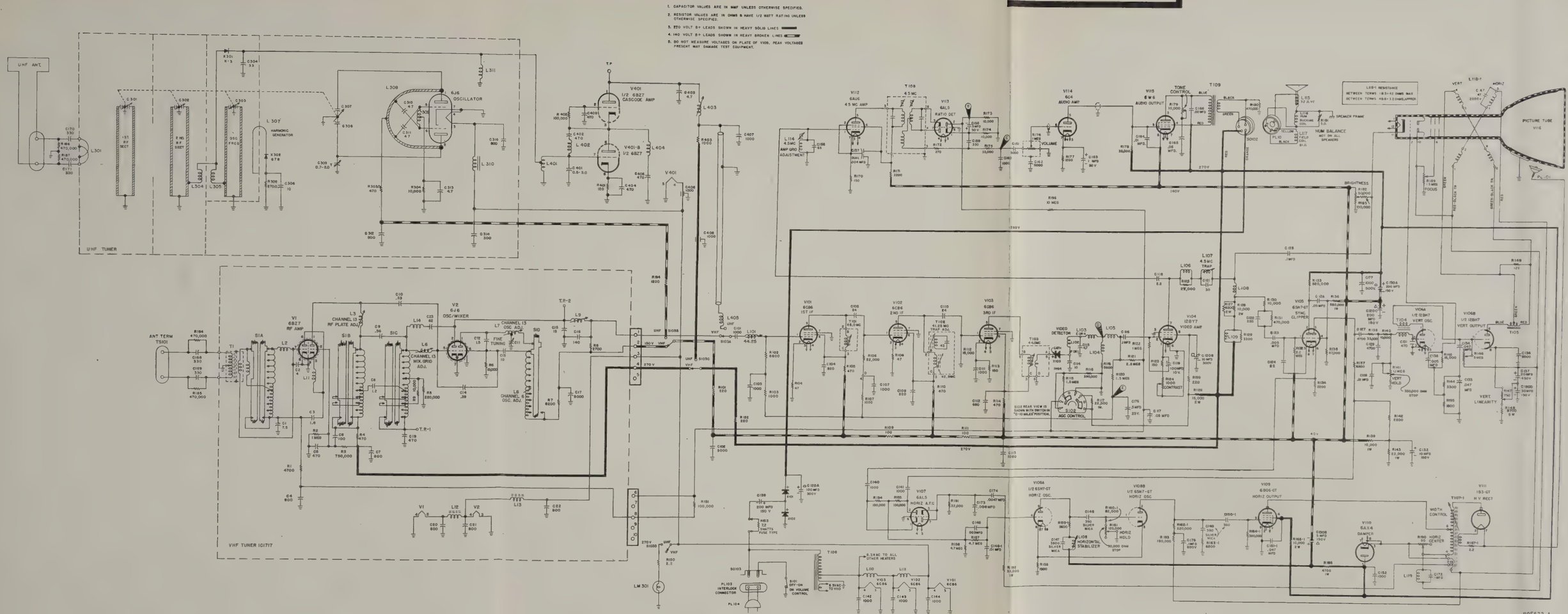


VHF-UHF
17" CHASSIS

D1300D
RUN 2



VHF
21" CHASSIS
E1300D
RUN 1

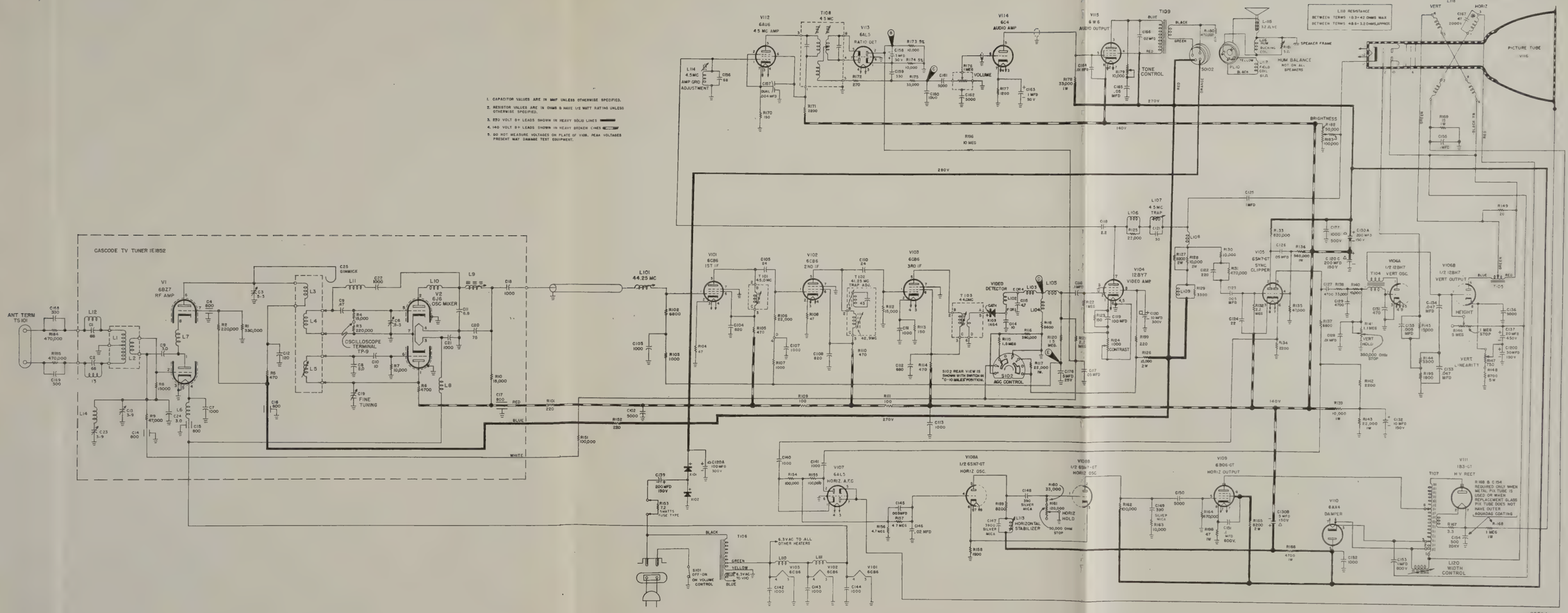


VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

9BX1198-1
1053

VHF-UHF
17" CHASSIS

D1300D
RUN 2



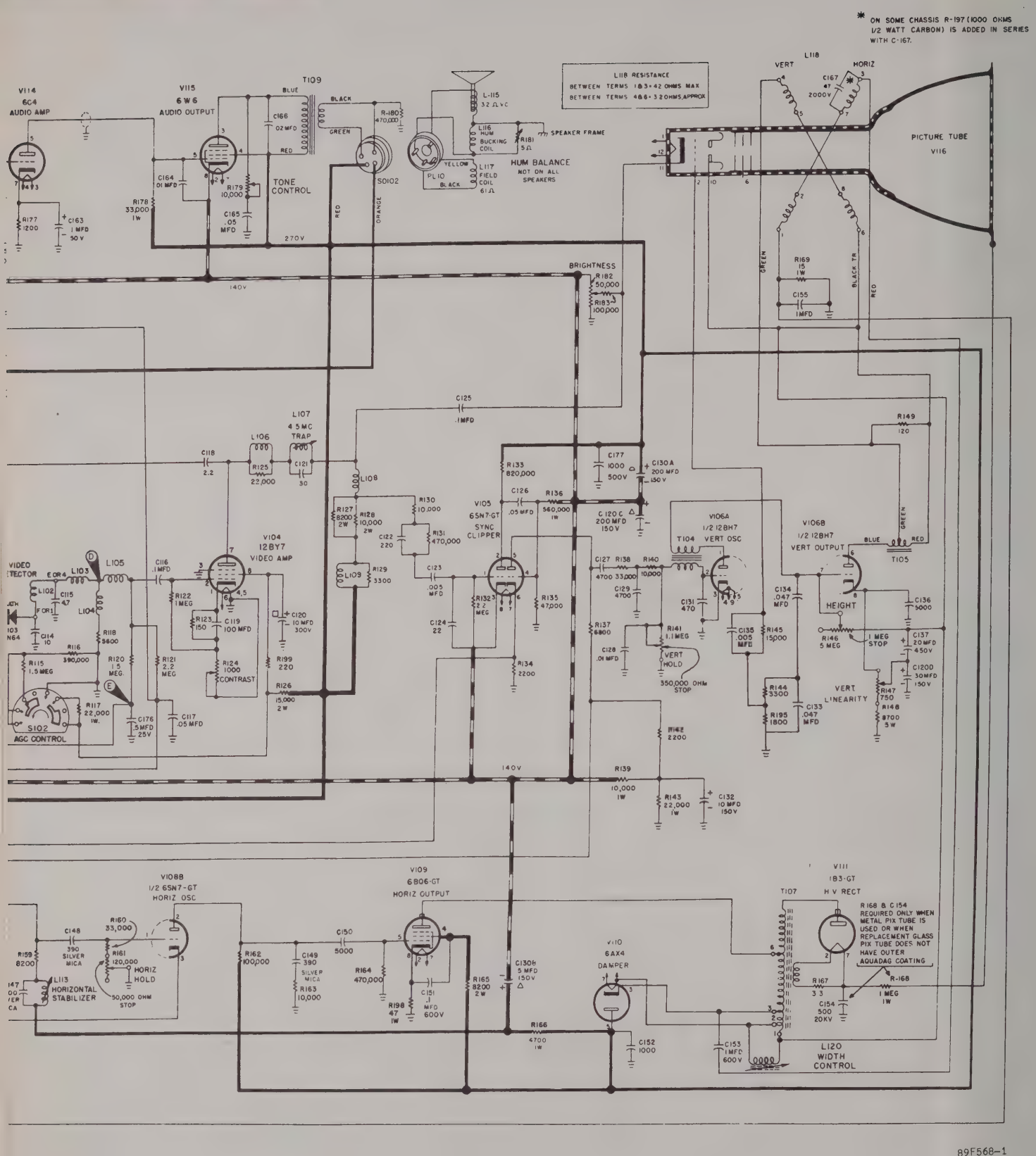
1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 270 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 140 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V108. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.

* ON SOME CHASSIS R-197 1000 OHMS 1/2 WATT CARBON IS ADDED IN SERIES WITH C-167

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

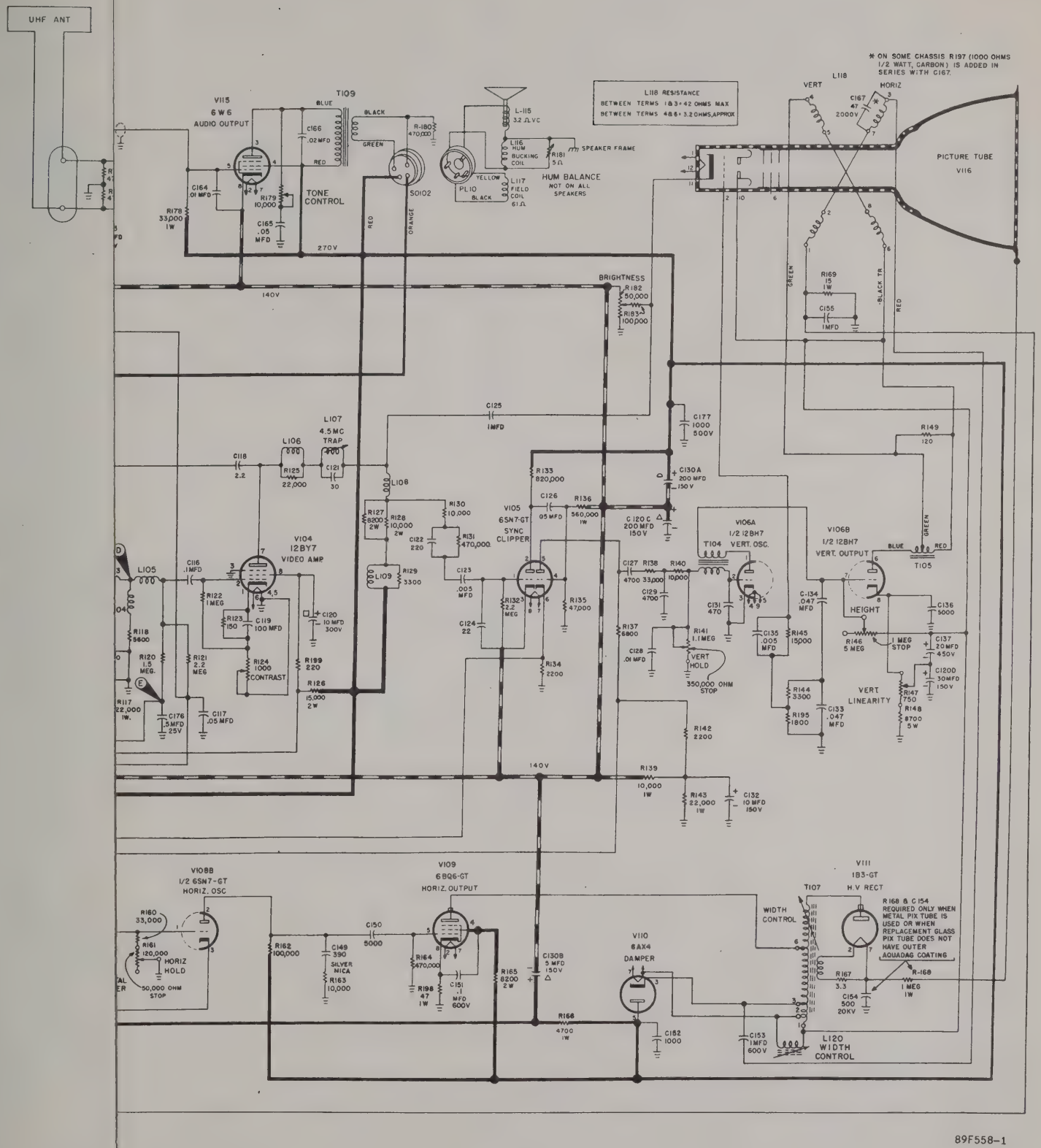
9AX1198-1
1053

VHF
21" CHASSIS
E1300D
RUN 1



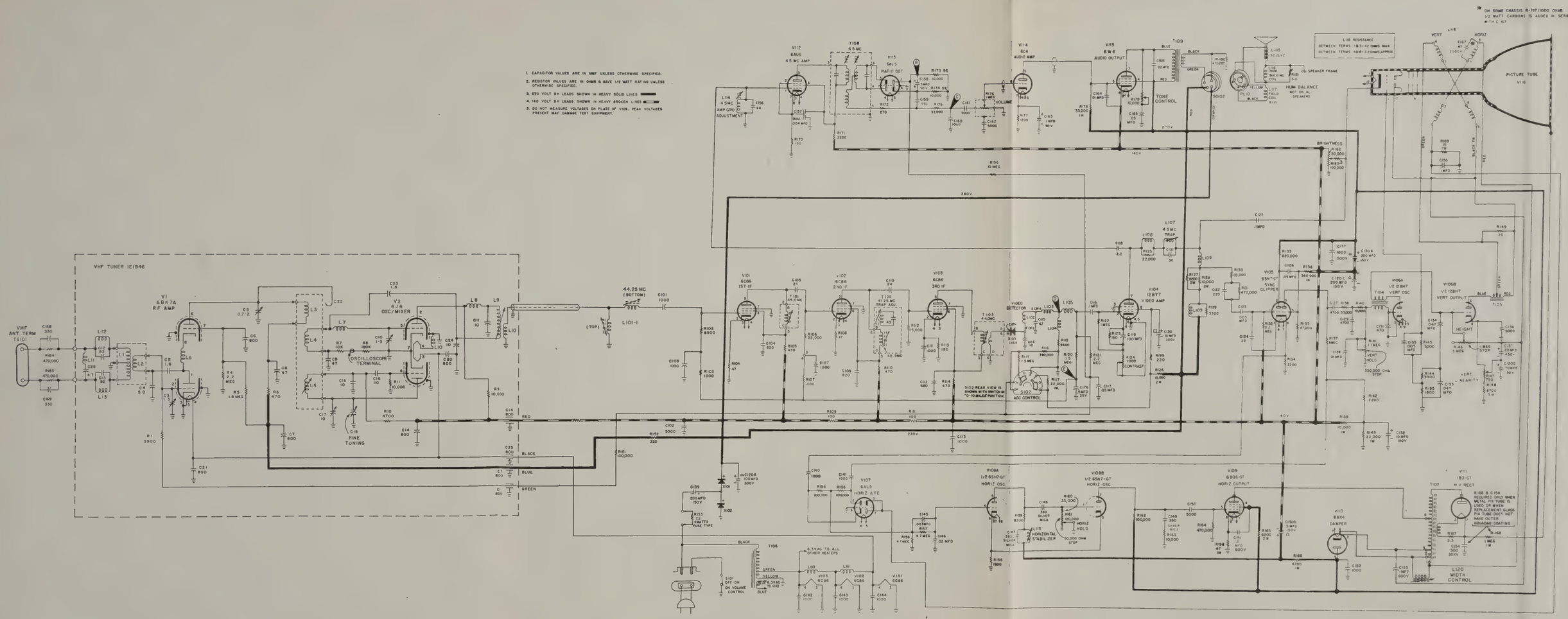
89F568-1

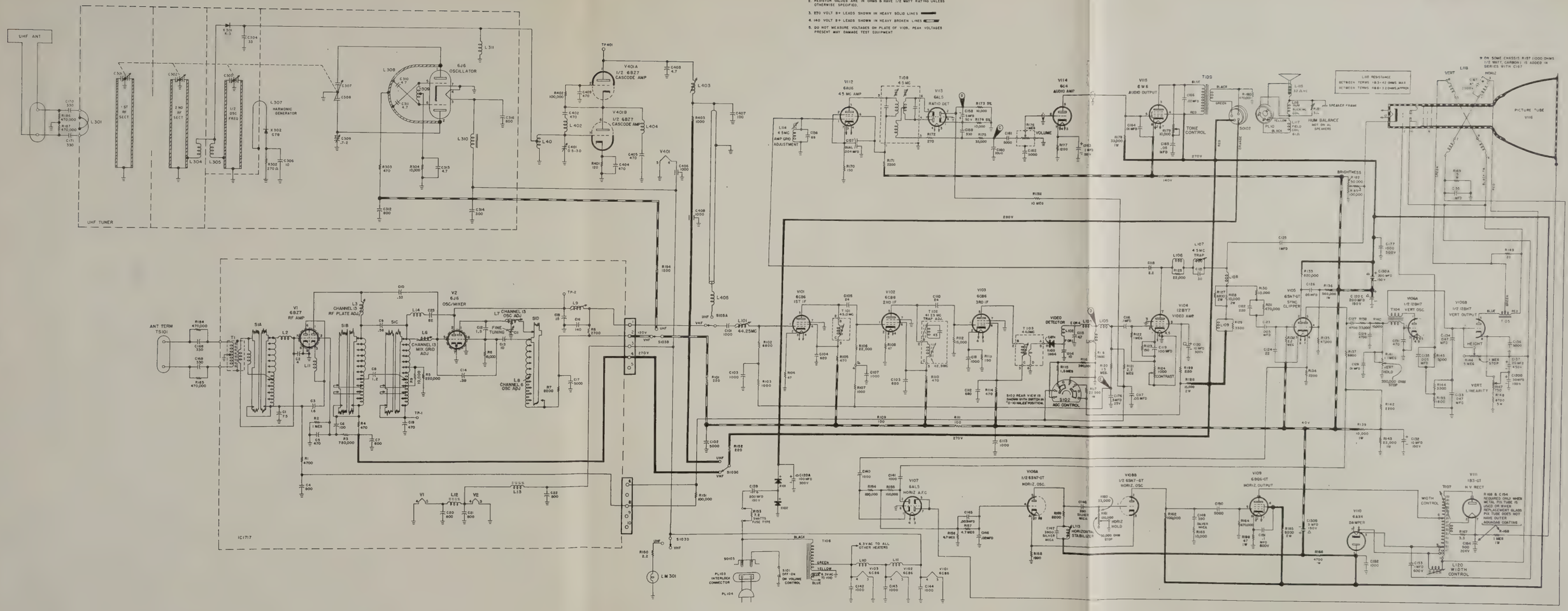
VHF
21" CHASSIS
E1300D
RUN 2



VHF-UHF
21" CHASSIS

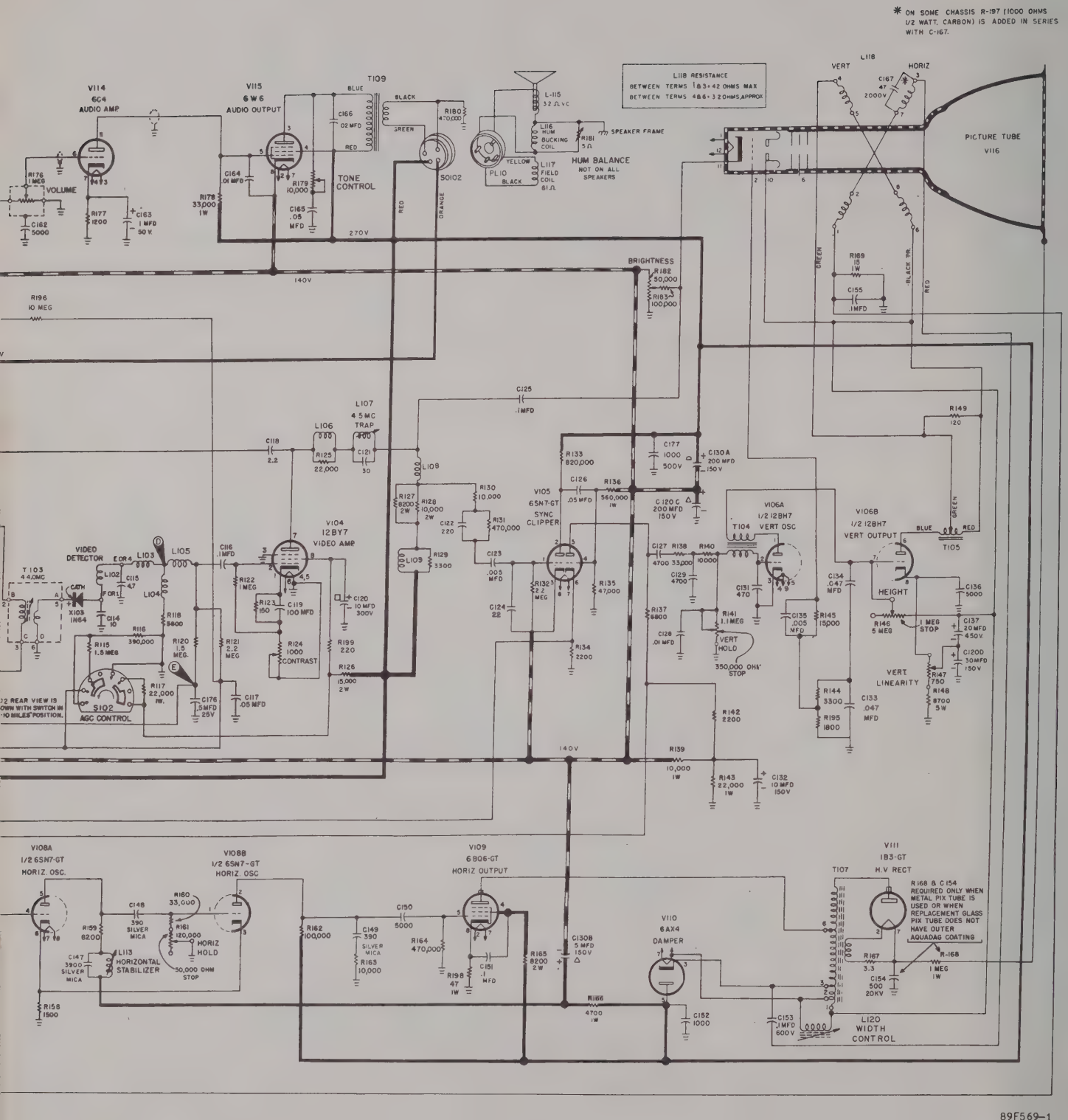
F1300D
RUN 1


1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. ETO VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES
4. 140 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.
* ON SOME CHASSIS R-197 (1000 OHMS 1/2 WATT CARBON) IS ADDED IN SERIES WITH C 47
VHF TUNER 1E1B46
V1 6BK7A RF AMP
V2 6J6 OSC/MIXER
OSCILLOSCOPE TERMINAL
FINE TUNING
VHF ANT TERM T101
44.25 MC (BOTTOM)
(TOP)
L101-1
V101 6CB6 1ST IF
V102 6CB6 2ND IF
V103 6CB6 3RD IF
V104 12BY7 VIDEO AMP
V105 6SN7-GT SYNC CLIPPER
V106A 1/2 12BH7 VERT OSC
V106B 1/2 12BH7 VERT OUTPUT
V107 6AL5 HORIZ AFC
V108A 1/2 6SN7-GT HORIZ OSC
V108B 1/2 6SN7-GT HORIZ OSC
V109 6BD6-GT HORIZ OUTPUT
V110 6B4-G DAMPER
V111 1B3-GT H.V. RECT
V112 6AU6 4.5 MC AMP
V113 6AL5 RATIO DET
V114 6C4 AUDIO AMP
V115 6W6 AUDIO OUTPUT
T101 4.5 MC
T102 4.5 MC TRAP ADJ.
T103 4.5MC
T104 VERT OSC
T105
T106
T107
T108 4.5MC
T109
L107 4.5MC TRAP
L108
L109
L110
L111
L112
L113
L114 4.5MC AMP GRID ADJUSTMENT
L115 32 µh
L116 HUM BUCKING COIL
L117 FIELD COIL 4-A
L118
L119 HORIZONTAL STABILIZER
L120 WIDTH CONTROL
X101
X102
S101 OFF-ON ON VOLUME CONTROL
S102 AGC CONTROL
S102 REAR VIEW IS SHOWN WITH SWITCH AT "0-10 MILES" POSITION.
VOLUME
TONE CONTROL
HUM BALANCE NOT ON ALL SPEAKERS
SPEAKER FRAME
PICTURE TUBE V116
BRIGHTNESS
HEIGHT
VERT LINEARITY
VERT HOLD
HORIZ HOLD
DAMPER
L118 RESISTANCE
BETWEEN TERMS 1&3=42 OHMS MAX
BETWEEN TERMS 4&6=3.2 OHMS APPROX
R196 10 MEG
280V
270V
140V
40V
6.3 VAC TO ALL OTHER HEATERS
6.3 VAC TO V110
BLACK
BLUE
GREEN
RED
YELLOW
R1 3900
R2 470,000
R3 470,000
R4 2.2 MEG
R5 1.8 MEG
R6 470
R7 10K
R8 180K
R9 10,000
R10 4700
R11 10,000
R12 6800
R13 100
R14 100
R15 1.5 MEG
R16 390,000
R17 22,000
R18 5600
R19 100,000
R20 1.5 MEG
R21 2.7 MEG
R22 1 MEG
R23 100
R24 1000 CONTRAST
R25 22,000
R26 5,000 2W
R27 5000 2W
R28 10,000
R29 3300
R30 10,000
R31 470,000
R32 1 MEG
R33 820,000
R34 2200
R35 4700
R36 560,000
R37 680
R38 1 MEG
R39 10,000 1W
R40 10,000
R41 1 MEG
R42 2200
R43 22,000 1W
R44 3300
R45 5000
R46 5 MEG
R47 1 MEG
R48 4700 5W
R49 20
R50 1 MEG
R51 100,000
R52 220
R53 72 5WATTS FUSE TYPE
R54 100,000
R55 100,000
R56 4.7 MEG
R57 8200
R58 33,000
R59 8200
R60 33,000
R61 150,000 HORIZ HOLD
R62 100,000
R63 10,000
R64 470,000
R65 6200 2W
R66 4700 1W
R67 3.3
R68 1 MEG 1W
R69 10 1W
R70 150
R71 2200
R72 870
R73 5%
R74 5% 10,000
R75 33,000
R76 VOLUME
R77 7500
R78 33,000 1W
R79 10,000
R80 470,000
R81 10
R82 500
R83 100,000
R84 470,000
R85 470,000
R86 180
R87 47
R88 1 MEG
R89 10 1W
R90 1 MEG
R91 1 MEG
R92 47
R93 47
R94 47
R95 1800
R96 47
R97 47
R98 47 1W
R99 220
C1 800
C2 800
C3 5
C4 5.0
C5 0.7-2
C6 800
C7 800
C8 47
C9 47
C10 1-3
C11 .8
C12 .82
C13 .82
C14 800
C15 10
C16 10
C17 10
C18 FINE TUNING
C19 10
C20 800
C21 800
C22
C23 1.5
C24 800
C25 800
C26 10
C27 .68
C28 .68
C29 .68
C30 10
C31 .68
C32 680
C33 1000
C34 1000
C35 1000
C36 1000
C37 1000
C38 1000
C39 1000
C40 1000
C41 1000
C42 1000
C43 1000
C44 1000
C45 1000
C46 1000
C47 .02 MFD
C48 .02 MFD
C49 330
C50 5000
C51 .003MFD
C52 .003MFD
C53 .003MFD
C54 .003MFD
C55 .003MFD
C56 .003MFD
C57 .003MFD
C58 330
C59 150
C60 1000
C61 5000
C62 5000
C63 .1 MFD 50 V
C64 .01 MFD
C65 .05 MFD
C66 .02 MFD
C67 47 200V
C68 2.2
C69 2.2
C70 .1 MFD
C71 .1 MFD
C72 .1 MFD
C73 .1 MFD
C74 .1 MFD
C75 .1 MFD
C76 .1 MFD 25V
C77 1000 500V
C78 .1 MFD
C79 .1 MFD
C80 .1 MFD
C81 .1 MFD
C82 .1 MFD
C83 .1 MFD
C84 .1 MFD
C85 .1 MFD
C86 .1 MFD
C87 .1 MFD
C88 .1 MFD
C89 .1 MFD
C90 .1 MFD
C91 .1 MFD
C92 .1 MFD
C93 .1 MFD
C94 .1 MFD
C95 .1 MFD
C96 .1 MFD
C97 .1 MFD
C98 .1 MFD
C99 .1 MFD
C100 .1 MFD
C101 1000
C102 5000
C103 1000
C104 820
C105 2.2
C106 .1 MFD
C107 1000
C108 820
C109 1000
C110 2.2
C111 .02 MFD
C112 .1 MFD
C113 1000
C114 .1 MFD
C115 .47
C116 .1 MFD
C117 .1 MFD
C118 2.2
C119 100 MFD
C120 10 MFD 300V
C121 .1 MFD
C122 .1 MFD
C123 .1 MFD
C124 .1 MFD
C125 .1 MFD
C126 .1 MFD
C127 .1 MFD
C128 .1 MFD
C129 .1 MFD
C130A 200 MFD 150V
C130B 200 MFD 150V
C130C 200 MFD 150V
C131 470
C132 10 MFD 150V
C133 .047 MFD
C134 .047 MFD
C135 .005 MFD
C136 3000
C137 .1 MFD
C138 .1 MFD
C139 200 MFD 150V
C140 1000
C141 1000
C142 1000
C143 1000
C144 1000
C145 .003MFD
C146 .02 MFD
C147 .1 MFD
C148 390 SILVER MICA
C149 390 SILVER MICA
C150 5000
C151 .1 MFD
C152 1000
C153 .1 MFD
C154 500
C155 .1 MFD
C156 .1 MFD
C157 .1 MFD
C158 330
C159 150
C160 1000
C161 5000
C162 5000
C163 .1 MFD 50 V
C164 .01 MFD
C165 .05 MFD
C166 .02 MFD
C167 47 200V
C168 2.2
C169 2.2
C170 .1 MFD
C171 .1 MFD
C172 .1 MFD
C173 .1 MFD
C174 .1 MFD
C175 .1 MFD
C176 .1 MFD 25V
C177 1000 500V
C178 .1 MFD
C179 .1 MFD
C180 .1 MFD
C181 .1 MFD
C182 .1 MFD
C183 .1 MFD
C184 .1 MFD
C185 .1 MFD
C186 .1 MFD
C187 .1 MFD
C188 .1 MFD
C189 .1 MFD
C190 .1 MFD
C191 .1 MFD
C192 .1 MFD
C193 .1 MFD
C194 .1 MFD
C195 .1 MFD
C196 .1 MFD
C197 .1 MFD
C198 .1 MFD
C199 .1 MFD
C200 10MFD 450V
C201 .1 MFD
C202 .1 MFD
C203 .1 MFD
C204 .1 MFD
C205 .1 MFD
C206 .1 MFD
C207 .1 MFD
C208 .1 MFD
C209 .1 MFD
C210 .1 MFD
C211 .1 MFD
C212 .1 MFD
C213 .1 MFD



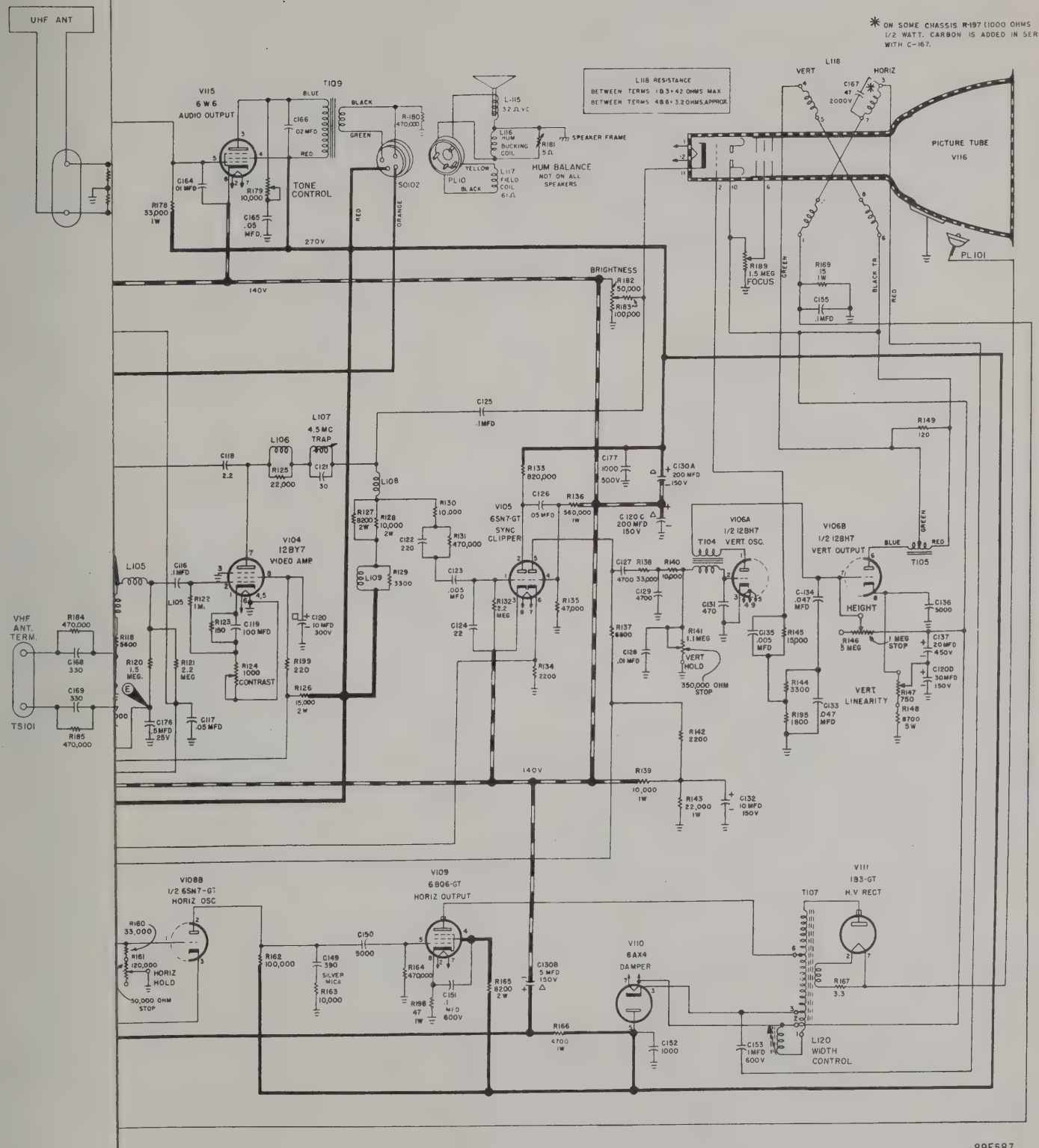
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF-UHF
21" CHASSIS
F1300D
RUN 1



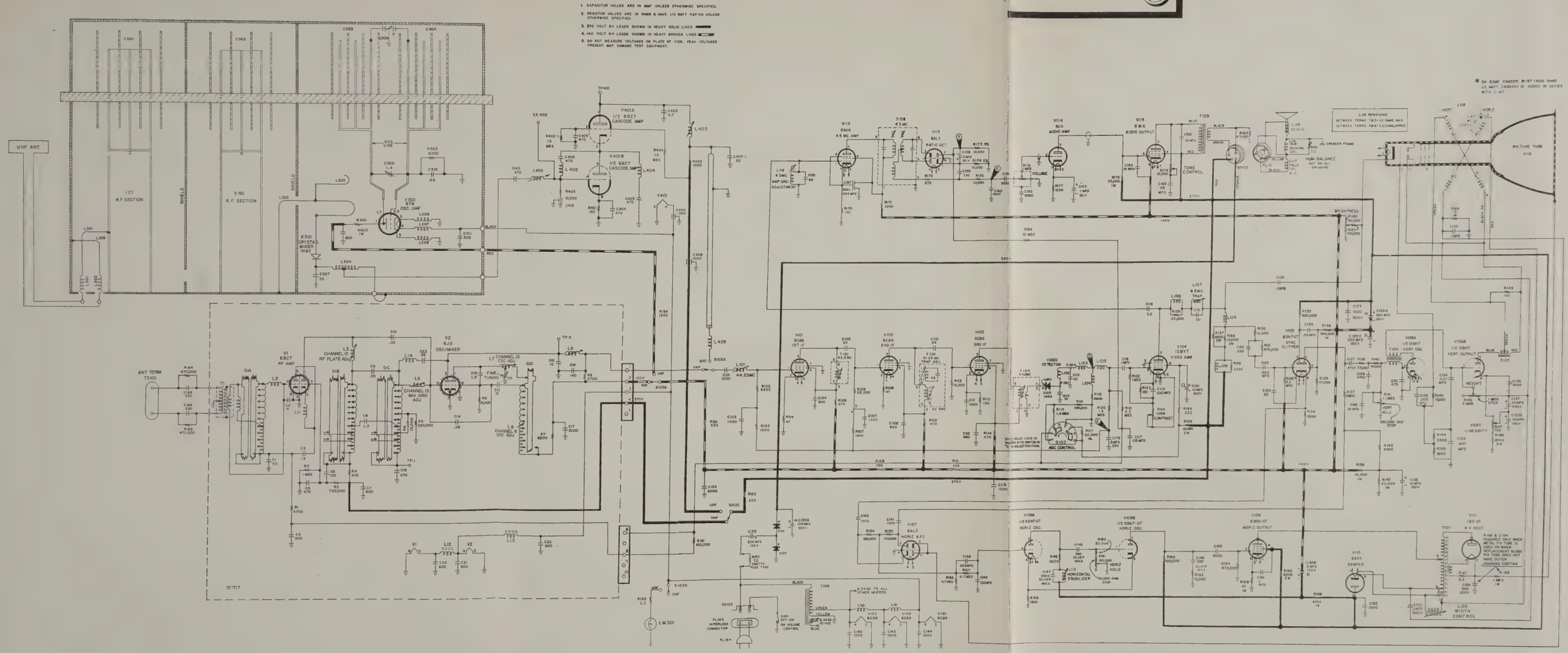
89F569-1

VHF-UHF
21" CHASSIS
F1300D
RUN 2



89F587

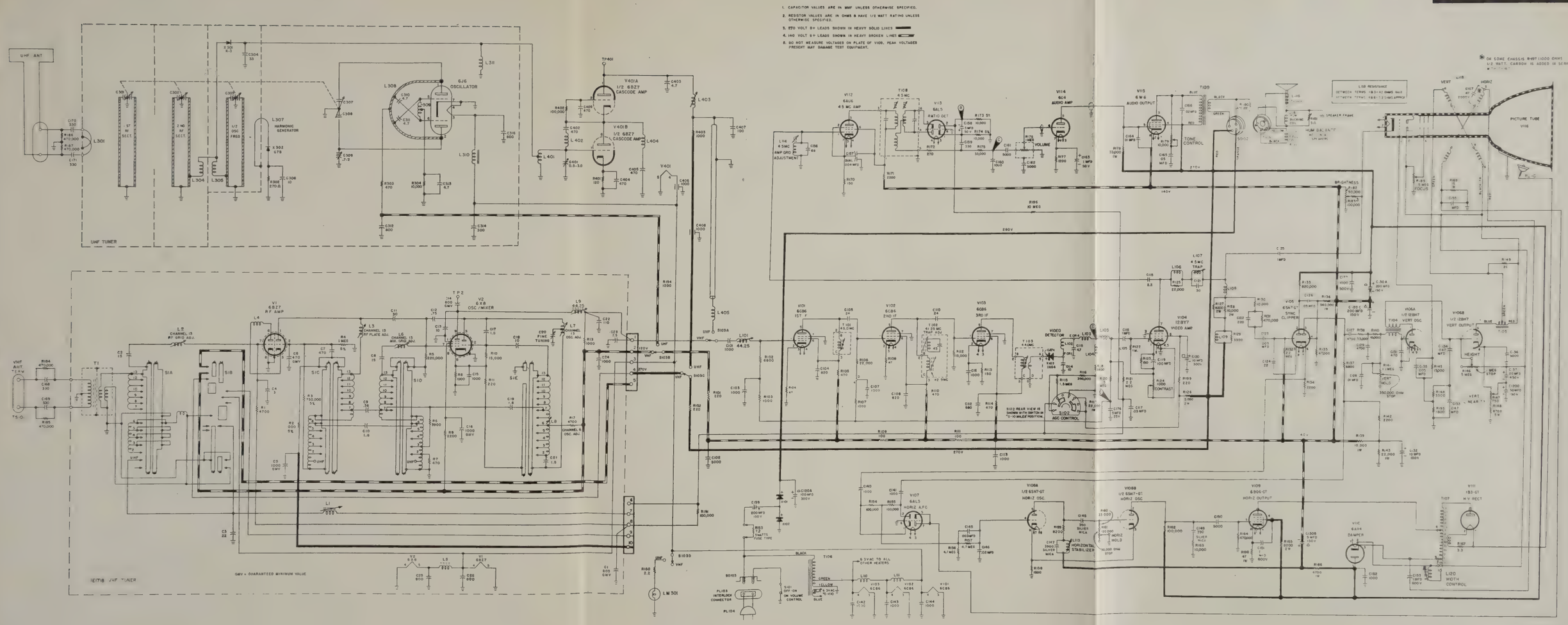
VHF-UHF
17" CHASSIS
B1300D
RUN 3



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF-UHF
21" CHASSIS

F1300D
RUN 2



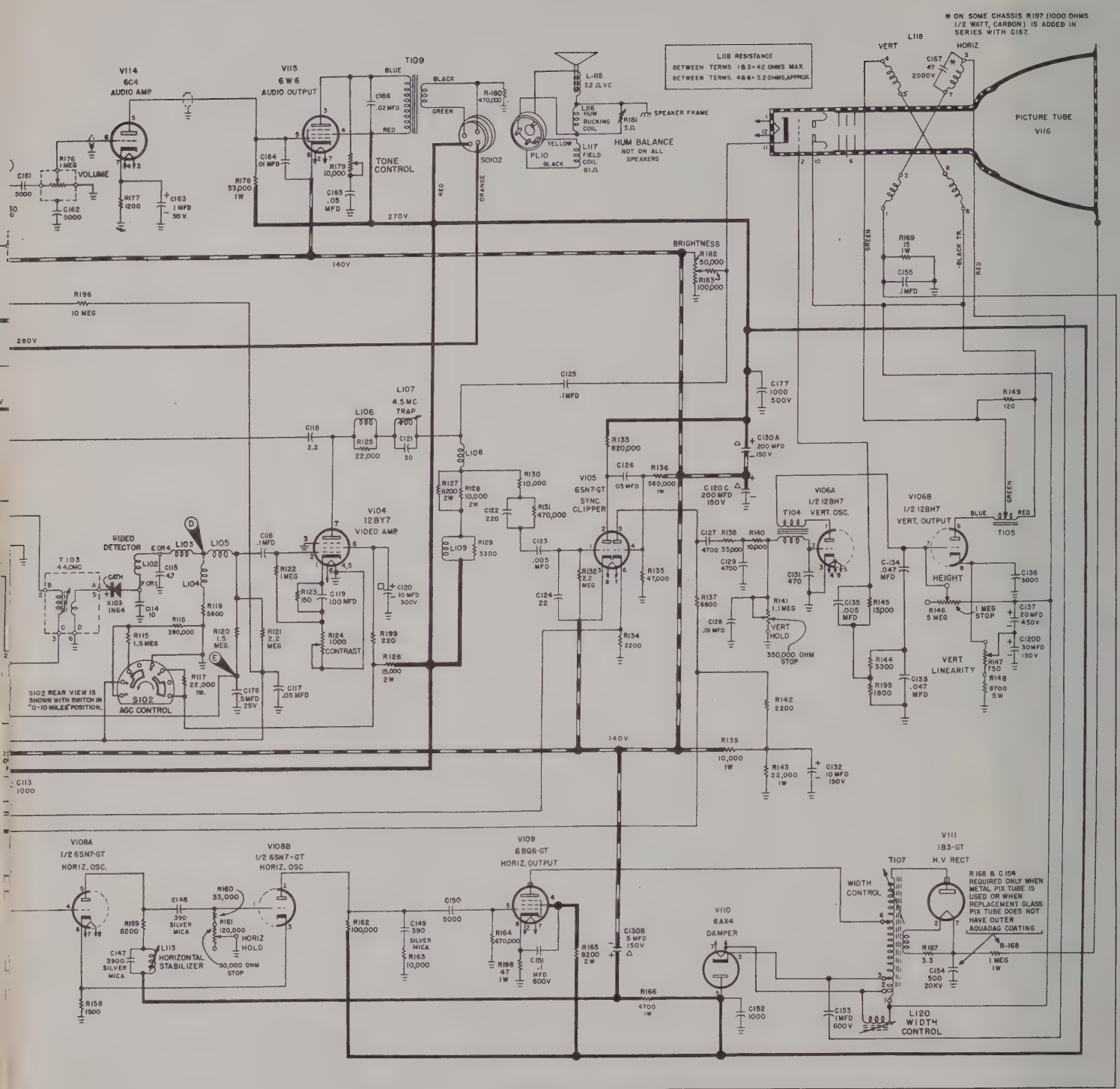
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF-UHF

17" CHASSIS

B1300D

RUN 3



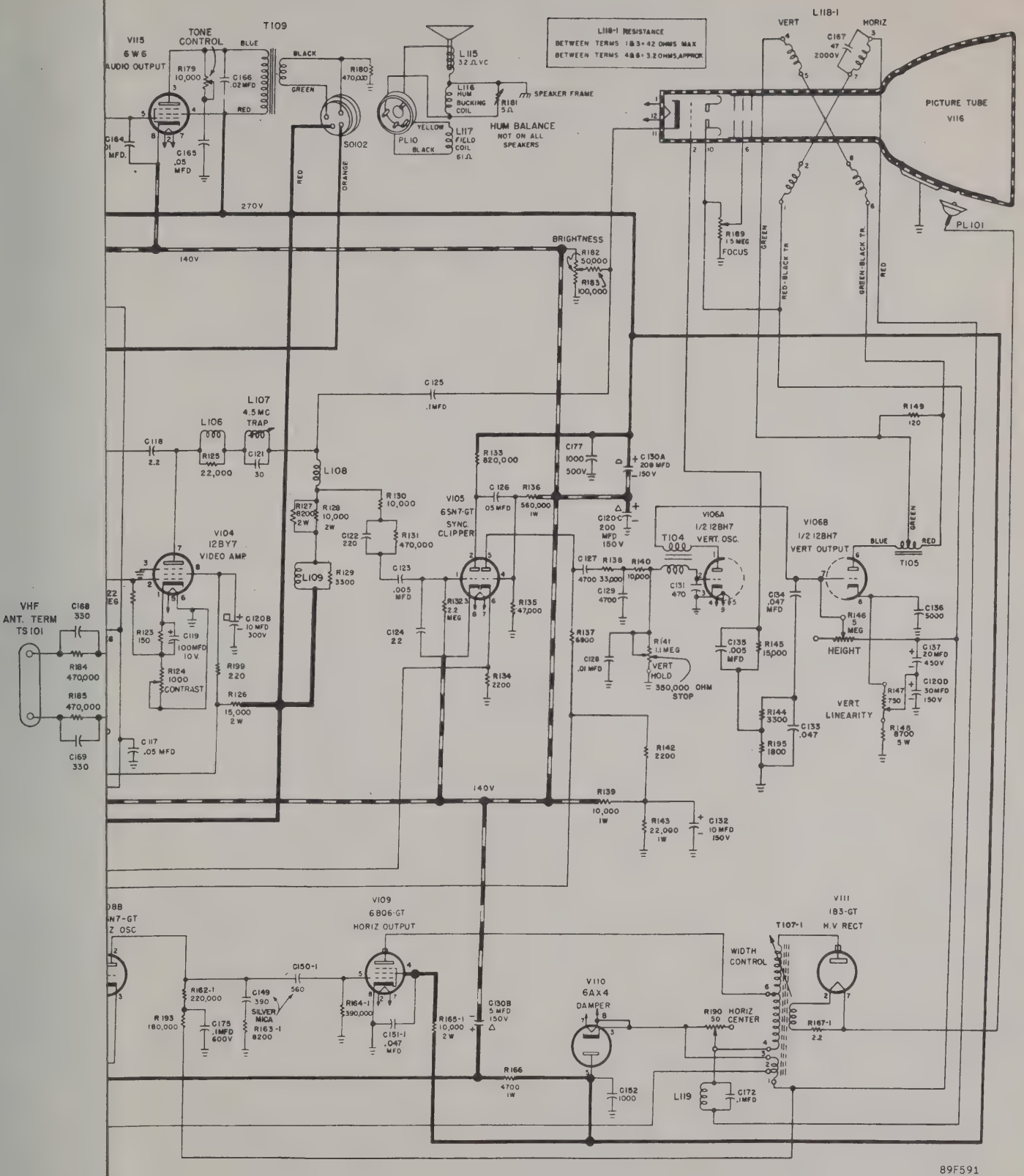
89F588

VHF-UHF

21" CHASSIS

F1300D

RUN 3



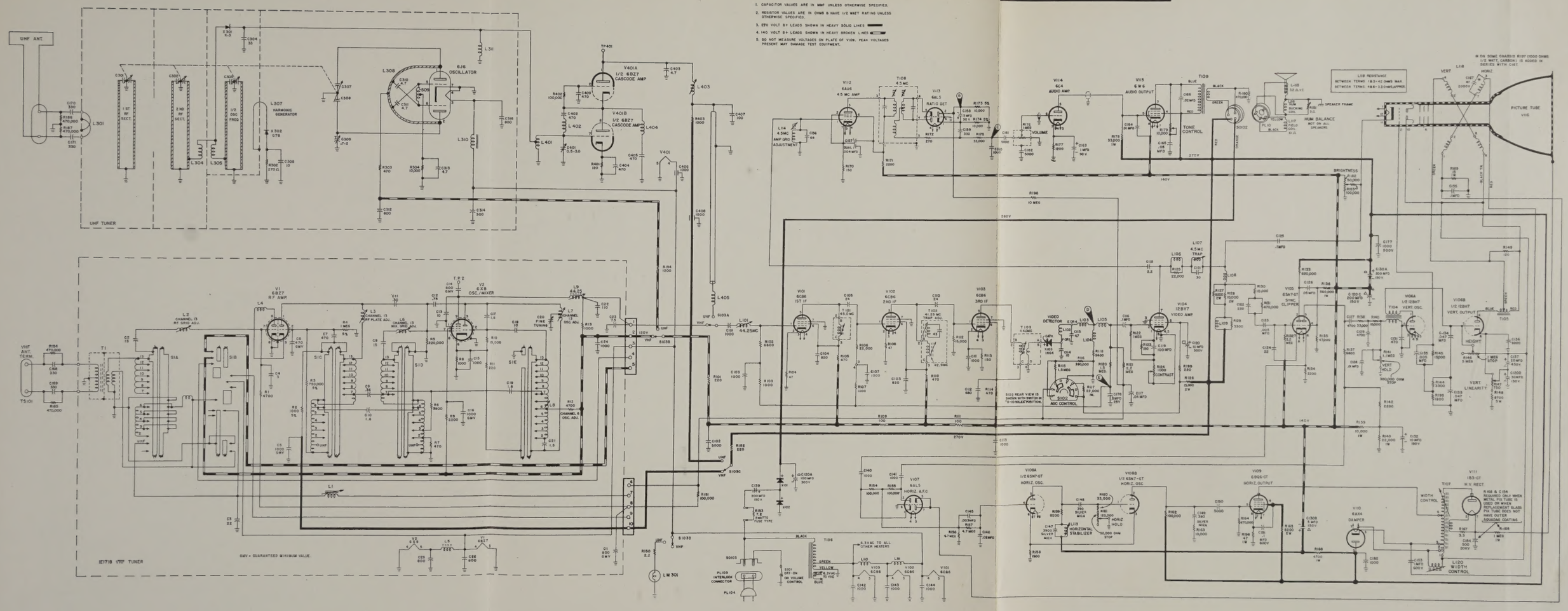
89F591

VHF

17" CHASSIS

C1300D

RUN 3



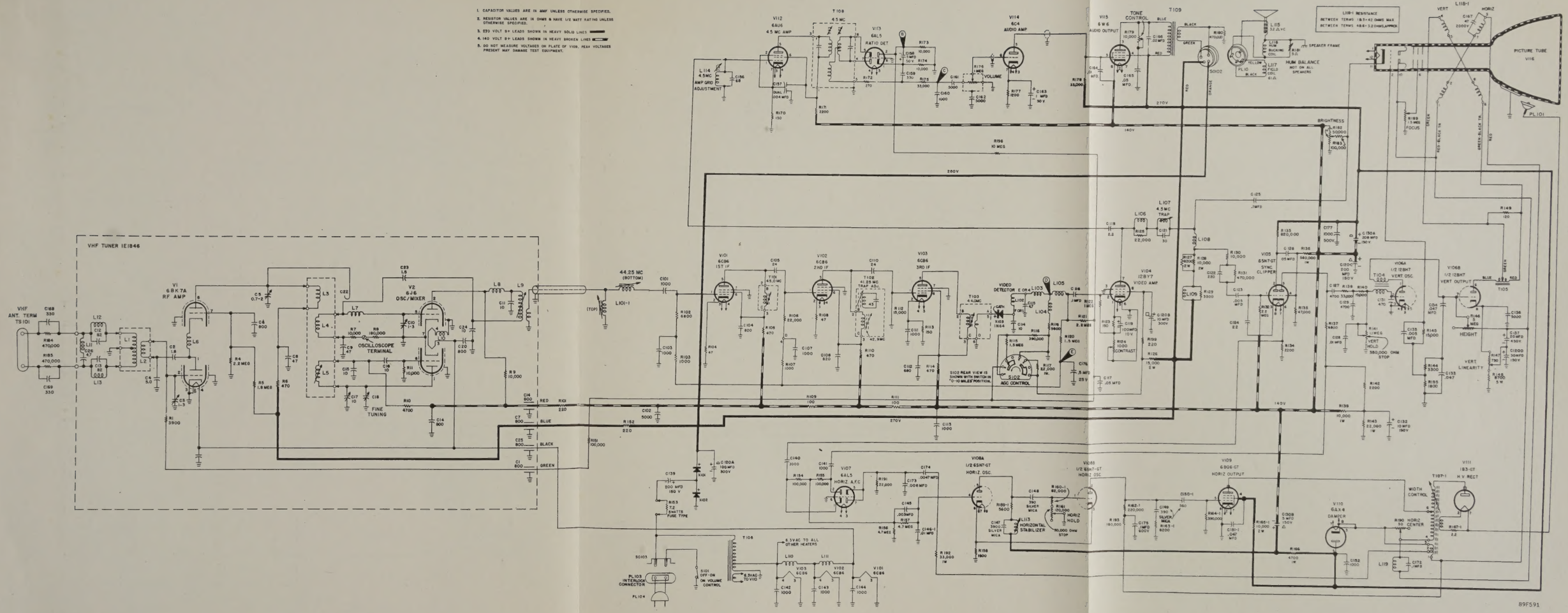
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF-UHF

21" CHASSIS

F1300D

RUN 3



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

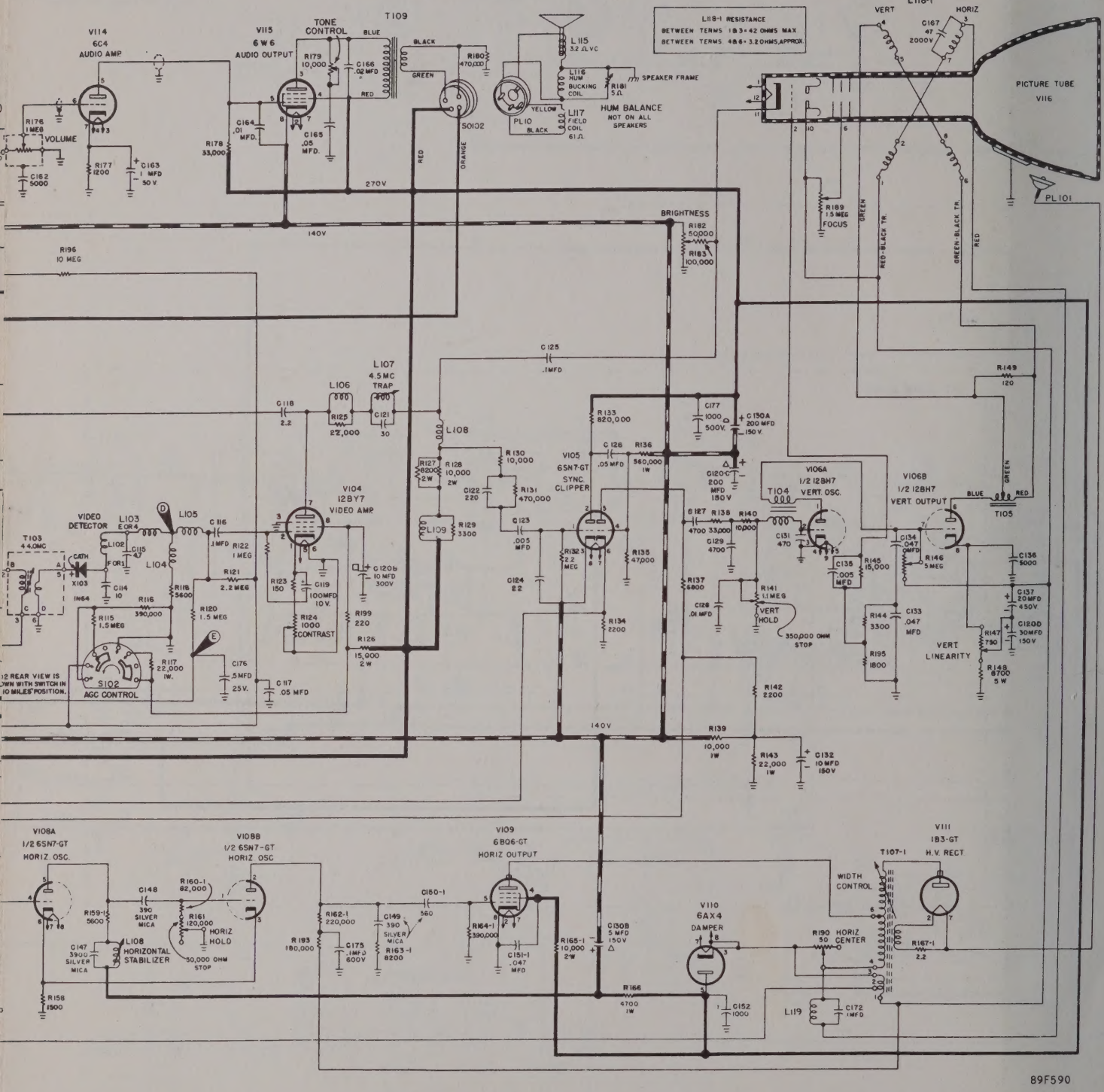
94X1198-1
1053

VHF

17" CHASSIS

C1300D

RUN 3

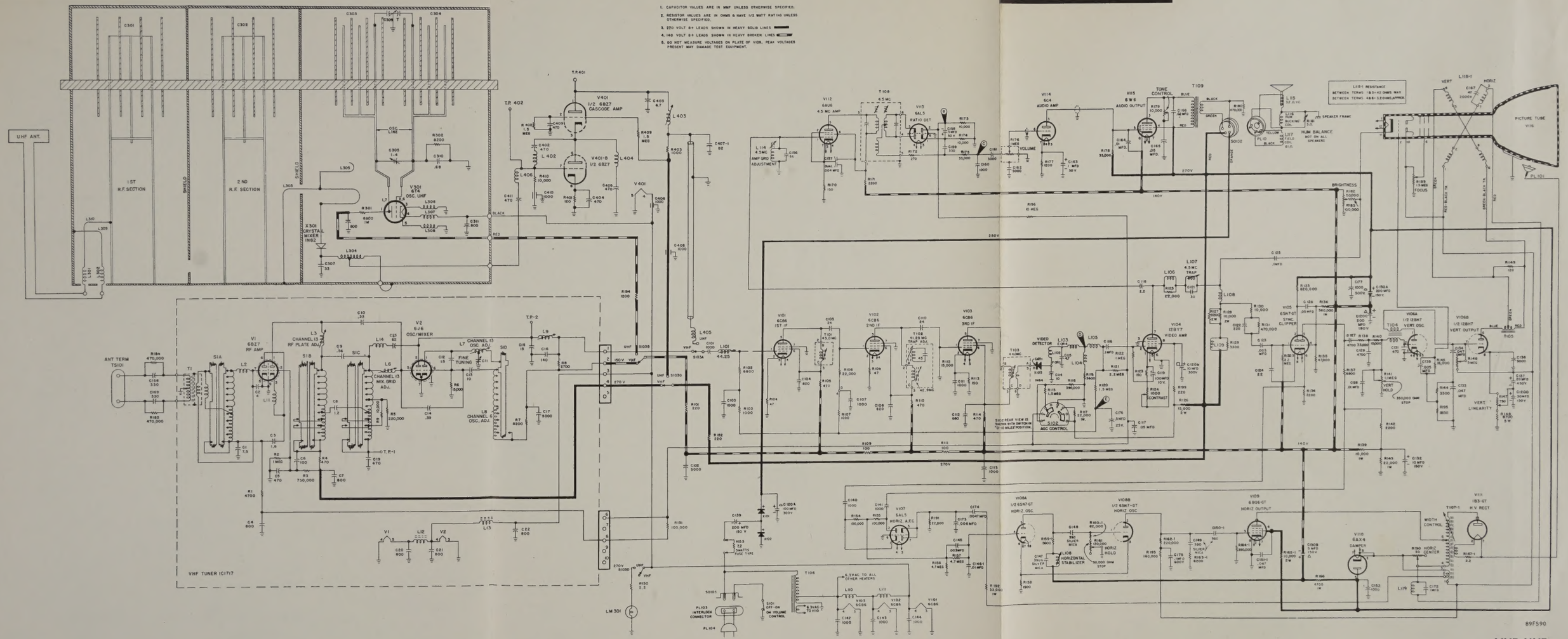


VHF-UHF

17" CHASSIS

D1300D

RUN 3



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

VHF-UHF

17" CHASSIS

D1300D

RUN 3